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EBASCO

ARCS II PROGRAM

Remedial Planning Activities at Selected Uncontrolled Hazardous Substance Disposal Sites Within EPA Region II (NY, NJ, PR, VI)

FINAL
SCREENING SITE INSPECTION (SSI)
CAPTAIN'S COVE CONDOMINIUM SITE
GLEN COVE, NASSAU COUNTY NEW YORK

SEPTEMBER 1995

VOLUME V OF V

EPA Contract 68-W8-0110

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EBASCO SERVICES INCORPORATED
ARCS II PROGRAM

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RADIOACTIVE CONTAMINATION AT

CAPTAIN'S COVE CONDOMINIUM SITE

The radiologically contaminated soils at the Captain's Cove Condominium Site should be remediated in accordance with current efforts underway at the Li Tungsten Site, a National Priority List (NPL) site.

The following presents relevant points regarding the similarities between the two facilities.

Historically a portion of the Captains Cove Condominium Site was used as a municipal sanitary landfill by the town of Glen Cove beginning in 1971 (Ref. 2, p. 10 of 16). It was speculated that the site was also used for disposal prior to this documented date (Ref. 3, p. 28 of 39). In the same time frame (the 1940s through the early 1970s), the nearby Li Tungsten facility processed tungsten ores with elevated concentrations of uranium and thorium (Ref. 4, p. 6 of 23). Anecdotal information coupling the sites was provided by a former employee of Li Tungsten (Ref. 5, p. 1 of 2). During a telephone interview the former employee noted that he was told by "old timers" that they routinely dumped waste slag at the Captain's Cove Condominium Site (Ref. 5, p. 1 of 2). Further, he stated that employees would take boxes or crates of material by fork lift down the road and dump the material at the Captain's Cove Condominium Site (Ref. 5, p. 1 of 2). This is similar to waste disposal at Li Tungsten, e.g., wastes were dumped in the parking lot near the main building, across the street by the woods, back by the reduction building and hydrogen tank (Ref. 5, p. 2 of 2).

The sites are located on the same road less than 1,000 feet apart (Ref. 6, p. 6 of 48). The land between the sites is a boat yard on which no known industrial processes occurred. The road is the only land access to both sites as they both abut Glen Cove Creek.

As regards to prior investigations, the source of the radiological materials at the Li Tungsten Site resulted from the smelting and refining of tungsten metal from ore materials principally Schelite ($CaWO_3$) from Canada and China that also contained concentrations of uranium and thorium as accessory metals (Ref. 4, p. 6 of 23). The smelting process extracted the tungsten metal and concentrated the uranium and thorium in the waste slag (Ref. 4, p. 6 of 23). Tungsten concentrations and other heavy metals in the waste are assumed to result from the fact that the refining process was imperfect (Ref. 7, pp. 19 and 20 of 27).

The concentrations of uranium and thorium in the tungsten ore and some thorium processing were sufficient to require Li Tungsten (and its predecessor the Wah Chang Trading Company) to acquire a Radioactive Materials License from the NYS Department of Labor i.e., and a United States Atomic Energy Commission Source Materials License i.e., a license for ores with concentrations equal to or greater than 0.05% by weight of uranium and/or thorium (Ref. 4, p. 7 of 23; Ref. 8, p. 1 of 2; Ref 9, p. 1 of 2).

The similarity of the radionuclides and concentrations on both sites was established through a review of prior investigations (Ref. 4, p. 6 of 23, Ref. 10, p. 28 of 70). On the Li Tungsten Site, concentrations of uranium and thorium in the input ores average about 10 pCi/g for all thorium

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and uranium chain nuclides, with measured concentrations in ore and intermediate processed material at 23 pCi/g ^{232}Th and 27 pCi/g ^{238}U(Ref. 4, p. 20 of 23),. The range of concentrations in waste material increased considerably up to and greater than 1,000 pCi/g (Ref. 4, p. 6 of 23). Similar radiological concentrations were found on the Captains Cove site (Ref. 10, p. 28 of 70). Trench samples taken by Fred C. Hart indicated concentrations in the 10 to 100's of pCi/g of uranium and thorium (Ref. 10, p. 28, 29, 30 of 70). It should be noted that the samples at the Captains Cove Condominium Site were taken in the fill material (from the surface to about the 10 feet depth) (Ref. 10, pp. 29, 30 of 70).

The last characteristic is the result of the recent soil investigation conducted in April 1995 (Ref. 11, pp. 1 to 28 of 28). A total of nine surface and three subsurface soil samples, including the background samples CC-SS11-01 and CC-SS11-02 (surface) and CC-SS11-03 (subsurface), were collected for analysis. The radiological and metal (tungsten) samples were taken from areas exhibiting elevated gamma exposure which were previously identified as containing radiological anomalies (Ref. 11, pp. 28 of 28). The background samples were taken from the Garvies Point Preserve (Ref. 11, pp. 28 of 28). The background sample location is off the site about 150 feet perpendicular to the north western edge of the site by the second gate (Ref. 11, pp. 28 of 28). No industrial processes or major disturbances e.g., fill deposition were known to be conducted at the background location (Ref. 11, p. 28 of 28). Five soils samples were collected from the Li Tungsten Site (Ref. 11, p. 28 of 28). The samples were analyzed for metals, including tungsten, and for radionuclides of the uranium and thorium decay series (Ref. 12, pp. 1 through 39, Ref. 13, pp. 1 through 45 of 45).

Background Sample Results

The background samples data indicate that natural uranium and thorium concentrations in this area are close to the average crustal abundance, with no evidence of elevated concentrations (Ref.13, pp. 24, 26, 43, 45 of 45). The crustal abundance is about 0.6 pCi/g for the members of the uranium series and 1 pCi/g for the members of the thorium series (Ref. 4, p. 6 of 23). Results of the background samples for the uranium series are presented in Table 1.

Table 1

	^{238}U (pCi/g	^{235}U (pCi/g)	^{234}U (pCi/g)	^{230}Th (pCi/g)
CC-SS11-02	0.953 ± 0.166	0.0388 ± 0.0306 J	0.847 ± 0.155	0.926 ± 0.133
CC-SS11-03	0.454 ± 0.114	0.0275 ± 0.027 J	0.505 ± 0.122	0.467 ± 0.166

Ref.13, pp. 24, 26, 43, 45 of 45

As indicated above, secular equilibrium is evident for ^{238}U, ^{234}U and ^{230}Th (Ref. 14, p. 3 of 3). Also the ratio of ^{234}U/^{235}U is 21.8 and 18.4 is close to the naturally expected abundance ratio of 22 for these two radionuclides (Ref. 14, p. 2 of 3).

The thorium series shows similar results in the background samples as presented in Table 2.

Table 2

	^{232}Th	^{228}Th
CC-S11-02	1.22 ± 0.153 J	1.13 ± 0.165 J
CC-S11-03	0.445 ± 0.114 J	0.471 ± 0.162J

Secular equilibrium is evident between these two thorium chain members in both samples (Ref. 13, p. 43, 45 of 45).

Correlated Radiological and Tungsten Contamination

All the soil samples collected from Li Tungsten with radiological concentration significantly above background also have high concentrations of tungsten.

Table 3

	^{232}Th (pCi/g)	^{238}U (pCi/g)	W (mg/kg)
LT-SS01-01	10.1 ± 3.55 J	52.2 ± 9.30 J	3050 J
LT-SS02-01	17.7 ± 4.65 J	26.2 ± 7.44	16200 J
LT-SS05-01	24.8 ± 6.49	165 ± 18.6	1160
LT-SS05-01D	25.1 ± 7.32	154 ± 18.3	1420 J

(Ref. 12, pp. 26, 27, 30, 31 of 39, Ref. 13, pp. 11, 12, 16, 17, 30, 31, 35, 36 of 45)

The same pattern of elevated concentrations is also observed in the Captain's Cove Condominium soil samples. That is elevated concentrations of uranium, thorium and tungsten.

Table 4

	^{232}Th (pCi/g)	^{238}U (pCi/g)	W (mg/kg)
CC-SS14-01	20.0 ± 5.71	18.6 ± 3.37	3200 J
CC-SS15-01	16.2 ± 4.40	18.4 ± 4.46	3820 J

(Ref. 12, pp. 20, 21 of 39, Ref. 13, pp. 22, 23, 41, 42 of 45)

This correlation strongly suggests that the ore and processed material was derived from a single source.

Uranium Decay Series Disequilibrium

Examination of the individual isotopes of the ^{238}U decay series presents additional evidence that the radiological constituents found on the two sites may have a common source (Table 5). In naturally occurring undisturbed radiological materials, all isotopes of the decay series are in a state of secular equilibrium, that is, they are all present at the same activity (Ref. 14, p. 3 of 3). This situation is illustrated by the background samples previously discussed (Table 1 and Table 2). If the decay members are subjected to chemical or physical separation, secular equilibrium may be disrupted, allowing the various isotopes to be present at significantly different activities. If, for example, uranium was preferentially extracted with the tungsten from the original ore, the isotopic activity of ^{238}U and ^{234}U would be less than the activity of ^{230}Th.

The tungsten refining operations at Li Tungsten included physical and chemical processes which included vibrating screens, magnetic separators, electrostatic separators, acid leaching, floatation and fusion (Ref. 7, pp. 15, 19, 20 of 27). Each of these processes has the ability to alter the initial secular equilibrium in the input tungsten ore. This is evident in the Li Tungsten samples as presented in Table 5.

Table 5

	^{238}U (pCi/g)	^{234}U (pCi/g)	^{230}Th (pCi/g)
LT-SS01-01	52.2 ± 9.30 J	46.3 ± 8.72 J	11.1 ± 3.70
LT-SS02-01	26.2 ± 7.44	10.7 ± 4.94	20.0 ± 4.96
LT-SS05-01	165 ± 18.6	155 ± 17.8	344 ± 24.7
LT-SS05-01D	154 ± 18.3	148 ± 17.8	303 ± 26.0

(Ref. 13, pp. 11, 12, 16, 17, 30, 31, 35, 36 of 45)

The disequilibrium in sample LT-SS02-01 is tenuous and could be a statistical anomaly as physical metal recovery processes would not separate ^{238}U from ^{234}U.

Similar states of disequilibrium are also observed in radiologically contaminated samples collected from the Captain's Cove Condominium Site as presented in Table 6.

Table 6

	^{238}U (pCi/g)	^{234}U (pCi/g)	^{230}Th (pCi/g)
CC-SS14-01	18.6 ± 3.37	23.9 ± 3.91	45.2 ± 7.47
CC-SS15-01	18.4 ± 4.46	20.8 ± 4.64	39.4 ± 6.90

(Ref. 13, pp. 22, 23, 41, 42 of 45)

Ratios of the radionuclides $^{238}U/^{234}U$, $^{230}Th/^{238}U$ and $^{230}Th/^{234}U$ corroborate the disequalibria (Table 7). The most highly contaminated samples from Li Tungsten (LT-SS05-01 and LT-SS05-01D) have essentially the same $^{230}Th/^{238}U$ and $^{230}Th/^{234}U$ ratios that are found in the contaminated Captain's Cove Condominium samples (CC-SS14-01 and CC-SS15-01). These ratios are significantly higher than those measured in the background soil samples CC-SS11-02 and CC-SS11-03, which exhibit secular equilibrium.

Table 7

	$^{238}U/^{234}U$	$^{230}Th / ^{238}U$	$^{230}Th / ^{234}U$
LT-SS05-01	1.06 ± 0.171	2.09 ± 0.279	2.22 ± 0.301
LT-SS05-01D	1.04 ± 0.176	1.97 ± 0.289	2.05 ± 0.302
CC-SS14-01	0.778 ± 0.190	2.43 ± 0.596	1.89 ± 0.440
CC-SS15-01	0.885 ± 0.292	2.14 ± 0.640	1.89 ± 0.537

Background Samples

Table 8

CC-SS11-02	1.13 ± 0.284	0.972 ± 0.219	1.03 ± 0.276
CC-SS11-03	0.899 ± 0.313	1.02 ± 0.444	0.92 ± 0.320

Thus the separation processes employed by the Li Tungsten facility are believed responsible for a similar departure from secular equilibrium observed in soil data from both sites.

The evidence presented above illustrates similarities between the uranium and thorium isotopic concentration and tungsten concentration found on the Captain's Cove Condominium Site and that found on the Li Tungsten Site. This particular combination of correlated concentrations can be explained by deposition of raw ore or intermediate or fully processed wastes from the Li Tungsten refining operation. As no similar refining process was conducted on the property designated as Captain's Cove Condominium Site, the existing information and similarities between the radiological contamination at both sites strongly suggest that the tungsten and radiological contaminants found in the Captains Cove Condominium samples originated from the adjacent Li Tungsten Site. This link provides a logical explanation for an otherwise rare combination of correlated isotopes and concentrations and thereby establish the similarities of the radiological wastes at the Li Tungsten and Captain's Cove Condominium Sites.

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REFERENCE 1

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Sites Which Are Difficult to Address

One commenter said that "unbounded or unmanageable sites, such as well fields" should not be included on the NPL. In response, EPA believes that unless a remedial investigation and feasibility study has been completed at a site, it is not possible to specify whether a site presents a manageable problem. Furthermore, at many of those sites where commonly applied remedial actions are infeasible, some response actions short of waste removal or source controls, e.g., providing alternative water supplies, may be appropriate. EPA believes that the technologies for response actions have been developing rapidly; a response which was infeasible in the past may become feasible in the near future. Finally, with the case specifically mentioned, wellfields, the Agency has generally found the need for CERCLA response particularly acute since this generally involves contamination of public water supplies. Hence, EPA has not attempted to exclude sites which are especially difficult to address through current response technologies.

Noncontiguous Facilities

Section 104(d)(4) of CERCLA authorizes the Federal government to treat two or more noncontiguous facilities as one for purposes of response, if such facilities are reasonably related on the basis of geography or their potential threat to public health, welfare, or the environment. As previously stated (48 FR 65056, September 8, 1983), for purposes of the NPL, EPA has decided that in most cases such sites should be scored and listed individually because the HRS scores more accurately reflect the conditions at the sites if each is scored individually. In other cases, however, the nature of the operation that created the sites and, possibly, the nature of the appropriate response may indicate that two geographically separate properties should be treated as one site for purposes of listing. EPA has done so for some sites previously listed separately on the NPL.

Factors relevant to such a determination may include whether the two or more areas were operated as parts of a single unit. Another factor is whether contamination from the two or more sites is threatening the same part of an aquifer or surface water body. Finally, EPA will also consider the distance between the noncontiguous sites and whether the target population (i.e., within 3 miles) is essentially the same or substantially overlapping for the sites.

One commenter, Governor Bond of Missouri, submitted the 33 known dioxin sites in that State as a single site on the NPL. Using characteristics from various sites, he assigned a single HRS score to the 33 sites. Governor Bond maintained that the dioxin was produced by a single waste generator and that the sites had a common method of disposal. According to the Governor, by treating the sites individually EPA has complicated negotiations for health studies, development of cost recovery suits, and the State's accounting procedures.

EPA carefully considered the Governor's proposal and, taking into account the factors discussed above, decided that his reasons did not warrant consolidating the 33 sites into a single site. The sites are dispersed over a wide area of the State and affect different target populations. The 33 sites generally comprised different disposal operations rather than parts of the same facility. Many of the 33 sites would not individually score high enough to be on the NPL and, thus, the overall score for the 33 sites would be misleading. EPA has also concluded that listing the 33 sites as a single site on the NPL is not a prerequisite for developing a consolidated response strategy for the Missouri dioxin sites. Many of these sites may qualify for Fund-financed removal actions. The Agency is currently evaluating ways of coordinating possible response strategies at these sites to alleviate the problems which Governor Bond has identified.

Another commenter expressed the view that any grouping of noncontiguous sites would be inappropriate. EPA disagrees. In some instances the property boundaries or other factors commonly used to define a site may not be very useful or reasonable for determining if a problem involves one site or several. One example is the Minker/Stout/Romaine Creek site in Missouri where dioxin contaminated soils were used as fill in several yards in a residential neighborhood. Even though the contaminated areas are not contiguous and the properties involved have several different owners, the Agency determined that the site was really a single operation, that the same target populations might be affected, and that there is no logic to support treating the various areas as separate sites. Given the many factors involved in making such determinations and the differing importance that each factor may take on in various situations, the Agency must weigh each situation individually to determine if noncontiguous disposal areas are single site or several.

Where EPA determines, based above considerations, that two noncontiguous locations are most logically considered as a single they will appear as a single site NPL. While the listing suggests prospective response actions, it prescribe them: EPA may decide response efforts should be dist separate for the two locations. Al EPA may decide to respond to sites listed separately on the NPL single response if it appears cost effective to do so.

Scoring of Air Releases

A comment was received conc how past air releases are scored. Language in the preamble to the NCP caused a commenter on the B Sorrell, Louisiana site to question whether past air releases may pr be included in a site's HRS score. issue is discussed in detail in the "Support Document for the revised National Priorities List—1984" for Bayou Sorrell site. However, the points of this issue are presented in following discussion.

EPA believes that past air releas included in a site's HRS score. The stipulates that a site is to be scored an air release if data "show levels of contaminants at or in the vicinity of facility that significantly exceed background levels, regardless of the frequency of the occurrence (47 FR 31236). According to the HRS as established in the NCP revisions, therefore, the single evidence of an release such as that which occurred Bayou Sorrell, requires that the site scored as having an observed rel air. This approach to scoring has be clarified by EPA's stated policy th sites are to be scored on the basis conditions existing before any re measures were performed. This po was clearly stated at the time of promulgation of the NCP revisions FR 31188), and EPA considers it to firmly established as part of the HR addition, the Agency has attemp clarify further the reasons for this in subsequent statements (48 FR 40 5).

Several considerations underlie policy. Actions by States to cond enforce cleanup might be discou partial cleanup of a site could re score such that the site would not eligible for the NPL.

Another concern is that respo parties might be encouraged to minimal, incomplete cleanup act sites that might reduce the HRS

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remedy the problems ...y. For example, a site may ...oblems in all three routes— ...ater, surface water, and air. ...the air route is remedied. In ...uation, because the partial ...ould leave significant health ...addressed, the site would not ...on the basis of the latest ... but rather on the basis of ... existing prior to the remedy ...route (48 FR 40664).

...consideration is that the HRS ...igned according to the ...ble approximations of risk that ...e derived from certain basic ...s at a site as they existed prior ...cleanup actions. Where the data ...reflect conditions after some ...actions, the assumptions upon ...the HRS was designed may no ...e appropriate, and the score ...not represent an approximation ...that is accurate or consistent ...ores for other sites. All three of ...considerations are explained in ...the preamble to the initial NPL ...40664–5).

...ther consideration is that the level ...uracy provided by the HRS and the ...ing process, while sufficient to ...e a general approximation of risks ...mparison among sites, is not ...ntly detailed to evaluate the ...acy of cleanup actions. The HRS ...signed to take into account as ...actors regarding the condition of ...and the risk they present as can be ...ered simply and for many sites ...the country. It does not take into ...l factors that the Agency believes ...d require sophisticated data or ...in developing the HRS. EPA ...ered evidence that a release ...background has occurred is ...ely easily determined. However, ...ency determined that evidence as ...ther past cleanup actions are ...to have eliminated the release ...otential for future releases is much ...difficult to obtain and evaluate.

after the NPL listing process has identified a limited number of sites as potential problems. Having taken this approach in the HRS, EPA must apply it consistently to individual sites.

A commenter on the Bayou Sorrell, Louisiana site cited preamble language which states that "air releases must currently exist, must be measured, and must not be caused by disturbances from investigations" (47 FR 31189). EPA believes that the commenter took this language out of context. Read in context, it in no way contradicts the Agency's policies of scoring on the basis of a single observation and scoring on the basis of conditions existing before any cleanup actions.

The portion of the preamble (47 FR 31189) containing this language was written in response to comments arguing that the HRS should provide for scoring for the potential of a release, rather than only scoring when an actual release is observed. The HRS does score for potential releases in the ground water and surface water routes if no actual release has been observed. For the air route, however, EPA believed that evidence of the potential for an air release could not be easily established and would be too tenuous a possibility to warrant taking it into account. Therefore, in order to calculate any score at all for the air route, an actual release must be observed. By stating that air releases must "currently exist," EPA was attempting to explain that the release must have actually occurred, rather than being merely a potentiality. This interpretation is consistent with the actual HRS instructions, which require "data that show levels of a contaminant at or in the vicinity of the facility that significantly exceed background levels, regardless of the frequency of occurrence" (47 FR 31230).

Any other interpretation of this language would be illogical. If the word "current" were to be interpreted as meaning "today," then an observed release to air would have to be

issues that were not site specific. General comments on the NPL are addressed throughout this preamble. Significant comments regarding specific sites are addressed in the "Support Document for the Revised National Priorities List—1984." A number of the site-specific comments addressed similar issues, and EPA's rationale for addressing those issues is presented in this section. Many of the issues raised in comments are the same as those raised previously and discussed in the previous final rulemaking on the NPL (48 FR 40658, September 8, 1983). The Agency's positions on these issues remains unchanged.

Waste Quantity

A number of commenters said that the waste quantity values assigned under the HRS were too high because EPA had included the non-hazardous constituents of the hazardous substances in calculating the quantity of waste located at the facility. Commenters raised similar issues when the first NPL was published (48 FR 40658, September 8, 1983), and EPA's response remains unchanged.

Consideration of Flow Gradients

In some instances commenters maintained that, based upon their conclusions regarding prospective movement of contaminants in ground waters, the values assigned by EPA to population served by ground water are too high. The commenters said that EPA should only count the population using those wells which they believed would be affected by the releases. As was the case with the waste quantity issue, this issue was addressed and resolved when the NPL was first promulgated (48 FR 40658). The rationale for the Agency's approach is futher discussed in the preamble to the NCP (47 FR 31190–91, July 16, 1982) and is equally applicable now. The HRS specifies that all the population using the aquifer of concern within 3 miles of the facility should be

...nsider eligible for listing on the NPL ...ration of this factor in the HRS. ..., the Agency decided not to ...evidence of frequency and ...ation of a release, as explained ...romulgation of the HRS (47 FR ...To do otherwise would render ...process unnecessarily ...e and time-consuming, which ...ert funds from cleanup ...and impede the progress of the ...EPA recognizes that these ...tions are very relevant to ...g the risks presented by a site ...edies, if any, that should be ...d. Factors of this type ...are intended to be evaluated

that as a policy matter ... This would not only entail considerable expense but would also allow the assignment of an observed release to the air to be negated by a removal or remedial action. The Agency has consistently scored sites on the basis of conditions before removal or remedial actions, as explained in 48 FR 40664.

VII. Changes From the Proposed NPL

The Agency received a total of 128 comments on the proposed NPL update. Of these, 112 comments pertained to 80 of the proposed sites. The remainder of the comments addressed sites that were not proposed or generic or technical

included in the calculations of population served by ground water. The Agency's approach is based on the difficulty of predicting precisely the movements of ground water based on the limited amount of data consistently available at the time of HRS scoring. Furthermore, in establishing the rating scales, the Agency took into account the fact that most wells within 3 miles would not be affected. If EPA were to establish rating scales based only on the populations that have been or are certain to be affected, the scales would have assigned high values for much smaller populations than those specified

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consider eligible for listing on the NPL those RCRA facilities at which a significant portion of the release appears to come from "non-regulated units" of the facility, that is, portions of the facility that ceased operation prior to January 26, 1983.

Releases of Mining Wastes

Some commenters presented the view that CERCLA does not authorize EPA to respond to releases of mining wastes, and that sites involving mining wastes should not be included on the NPL. This view is based on the interpretation that mining wastes are not considered hazardous substances under CERCLA. CERCLA includes in its definition of hazardous substances materials that constitute hazardous wastes under the Resource Conservation and Recovery Act (RCRA). In the 1980 amendments to RCRA, the regulation of mining wastes under Subtitle C of RCRA was temporarily suspended and that suspension is presently in effect. For that reason, the commenters believe that mining wastes should not be considered hazardous substances under CERCLA.

EPA disagrees with the commenters' interpretation. The Agency believes that mining wastes can be considered hazardous substances under CERCLA if it meets any of the other statutory criteria (e.g., if the material is also a hazardous air pollutant listed under section 112 of the Clean Air Act). More importantly, however, EPA's authority to respond to mining waste releases, and the Agency's ability to list mining waste sites on the NPL, does not depend on whether mining wastes are hazardous substances. Section 104(a)(1) of CERCLA authorizes EPA to respond to releases of not only "hazardous substances," but also "any pollutant or contaminant." "Pollutant or contaminant" is defined very broadly in section 104(a)(2) to include essentially any substance that may cause an adverse effect on human health. EPA is convinced that mining wastes can satisfy these minimal criteria, that the Agency therefore has the authority to respond to releases of mining wastes, and that listing of mining waste sites on the NPL is appropriate.

Commenters also presented the view that it is unclear whether CERCLA was intended to address the type of waste problem, characterized by low concentrations and large volumes, associated with mining waste. They argued that the approach taken under RCRA, of preparing a study of mining wastes before determining whether regulation of such wastes is appropriate, should be adopted in the CERCLA program as well. Commenters suggested that as a policy matter, long term permanent remedial actions could be postponed and only removal actions taken at such sites when emergency conditions warrant.

As described above, however, the response authorities of CERCLA are very broad. As long as EPA has the authority to respond, and no other Federal statute provides authority comparable to CERCLA, the Agency has the obligation at least to evaluate the precise extent of the risk and the possible response actions at all sites that upon preliminary investigation appear to present a significant risk. EPA should also remain free at least to consider all types of response actions at all sites in order to determine which is the most appropriate and cost-effective, and should not limit itself to considering only removal actions at a particular class of facilities. Inclusion of the NPL is appropriate in order to begin the process of determining how to address such sites. Since inclusion on the NPL does not determine whether response actions will be taken or what response is appropriate, EPA is free to develop an approach for responding to mining waste sites that takes into account any unique features of such sites.

Comments also presented the view that the HRS is not an appropriate tool to estimate the risk to health and the environment presented by mining waste sites.

They pointed out that the HRS does not consider concentration levels at the point of impact, but rather the mere presence of the substance in the environment. As explained in Part VII below, however, the purpose of scoring for an observed release without taking level of concentration into account is simply to reflect the likelihood that the subject substances will migrate into the environment, which in the case of an observed release is 100 percent. Future releases, or even current releases for which concentration data do not exist, may raise the level of concentration to the point that it presents a greater risk than the release first observed. While releases from mining waste sites may be somewhat less likely than releases of man-made chemical substances to ever reach extremely high concentrations, harmful concentrations can occur from mining waste sites and the distinction is not sufficient to invalidate the HRS as an appropriate model for scoring mining waste sites.

Another comment was that the locations of mining waste sites are generally rural, so that the only sizable target population are far downstream. The comment alleged that these populations are considered in the HRS scoring but in reality may never be affected. This assumption, however, is false. The HRS considers only those persons living within a three mile radius of the site as constituting the target population. If a mining waste site has a high score for this factor, it indicates that despite the fact that the locations of such sites typically are rural, this particular site has a significant number of people within three miles.

Indian Lands

EPA has always considered sites on Indian lands to be eligible for inclusion on the NPL. However, one commenter was concerned that some sites on Indian lands may not have been included in the State evaluation of NPL candidate sites because Indian lands are not subject to State jurisdiction. The Agency recognizes that this may happen. However, EPA Regional Offices may also evaluate sites for inclusion on the NPL. The Agency urges commenters to submit information on any sites which they feel may not have been evaluated during preparation of the NPL for consideration in subsequent updates.

Non-Contiguous Facilities

Section 104(d)(4) of CERCLA authorizes the Federal Government to treat two or more non-contiguous facilities as one for purposes of response, if such facilities are reasonably related on the basis of geography or on the basis of their potential threat to public health, welfare, or the environment. For purposes of the NPL, however, EPA has decided that in most cases such sites should be scored and listed individually because the HRS scores more accurately reflect the hazards associated with a site if the site is scored individually. In other cases, however, the nature of the operation that created the sites and the nature of the probable appropriate response may indicate that two non-contiguous sites should be treated as one for purposes of listing and EPA has done so for some sites on the final NPL.

Factors relevant to such a determination include whether the two sites were part of the same operation. If so, the substances deposited and the means of disposal are likely to be similar, which may imply that a single strategy for cleanup is appropriate. In addition, potentially responsible parties would generally be the same for both sites, indicating that enforcement or cost recovery efforts could be very similar for both sites. Another factor is whether contamination from the two sites are threatening the same ground water or

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surface water resource. Finally, EPA will also consider the distance between the non-contiguous sites and whether the target population is essentially the same or substantially overlapping for both sites, bearing in mind that the HRS uses the distance of three miles from the site as the relevant distance for determining target population.

Where the combination of these factors indicates that two non-contiguous locations should be addressed as a single site, the locations will be listed as a single site for purposes of the NPL. While the nature of the listing may be a guide to prospective response actions, it is not determinative; EPA may decide that response efforts, after all, should be distinct and separate for the two locations. Also, EPA may decide to coordinate the response to several sites listed separately on the NPL into a single response action when it appears more cost-effective to do so.

VII. Changes From the Proposed NPL

The Agency received a total of 343 comments on 217 of the sites listed on the proposed NPL. General comments on the NPL are addressed throughout this preamble. Significant comments regarding specific sites are addressed in the Support Document for the National Priorities List, previously cited. A number of the site-specific comments addressed similar issues, and EPA's approaches to those common issues are presented in this section.

A total of 144 HRS score changes have resulted from the Agency's reviews of comments and other information, and these are summarized in Table I. EPA determined that a total of five sites that had been proposed have HRS scores below 28.50 and should not be included on the NPL. For seven sites, the Agency is still considering the comments received concerning those sites and was unable to reach a final decision on listing in time for this publication. EPA will continue to evaluate these sites and make a final decision on them in a future update to the NPL. In one instance, where cleanup actions have adequately addressed the problems, EPA determined that a site should be deleted from the proposal and not included on the final NPL. In addition, two States have revised their designations of top priorities. These items are addressed below.

Waste Quantity. A number of commenters said that the waste quantity values assigned under the HRS were too high, because EPA had included the non-hazardous constituents of the hazardous substances in calculating the quantity of waste located at the facility. This issue was raised and resolved when the Agency adopted the HRS. In the preamble to that publication (47 FR 31190, July 16, 1982), EPA addressed the rationale for including all constituents, including the non-hazardous portions of the materials, in the calculation of the quantity of hazardous waste at a site. Briefly stated, the rationale for the Agency's approach is that detailed information of the portion of the total substances at a site that consist of hazardous constituents is expensive to determine, and therefore, because of the need to use a consistent method of evaluation of this factor at many sites nationwide, cannot be required as an element necessary for HRS scoring. EPA recognizes that most hazardous wastes contain some fractions of non-hazardous substances, and this fact was taken into account when the rating scales for waste quantity were established. In most instances a very small amount of the hazardous substances can have a significant impact on public health, welfare, or the environment. The Agency did not revise waste quantity values in response to comments presenting calculations that excluded the non-hazardous constituents.

Consideration of Flow Gradients. In some instances commenters maintained that, based upon their conclusions regarding prospective movement of contaminants in ground waters, the values assigned by EPA to population served by ground water are too high. The HRS, however, specifies that all the population using the aquifer of concern within a three mile radius of the facility should be included in the calculations of population served by ground water. The Agency's approach is based on the difficulty of predicting precisely the movements of ground water; furthermore, in establishing the rating scales, the Agency took into account the fact that most wells within the three mile radius would not be affected. As was the case with the waste quantity issue, this issue was addressed and resolved in adopting the HRS in July 1982. The rationale for the Agency's approach is further addressed in the preamble to the NCP (47 FR 31190–91, July 16, 1982) and is equally applicable now.

Scoring on the Basis of Current Conditions. Some commenters felt that EPA should take current conditions into account when scoring sites where response actions have reduced the hazards posed by the site. EPA scored sites for inclusion in the NPL based on the hazards that existed before any response actions were initiated. This policy was explained in the preamble to the final revisions to the NCP (47 FR 31187, July 16, 1982). The Agency explained that public agencies might have been discouraged from taking response if such actions could lower the HRS score and prevent a site from being included on the NPL. This has turned out to be the case, as at least one State and some EPA Regional Offices have actually sought reassurances prior to taking emergency action at sites that the site's HRS score would not be lowered as a result of the response action. Alternatively, some private parties might have only taken action sufficient to lower the score to the point that it would not be listed on the NPL but would not be completely cleaned up. Those types of score manipulations could be accomplished by such actions as temporarily removing wells from service to lower target scores, or removing wastes from a site to lower waste quantity scores while failing to address contaminated ground water, or by remedying only air discharges when ground or surface water contamination also present a problem. Therefore, EPA was and is concerned that scoring on the basis of the latest conditions at a site could encourage incomplete solutions that might leave significant health threats unaddressed.

Even where the response actions occurred before the listing process began, EPA believes that these actions should not be considered when scoring the site for the NPL. The ability of the HRS to approximate risk at a given site is based on a number of presumed relationships between the various factors considered in calculating the HRS scores. When partial response actions are conducted, the validity of these relationships for the purpose of approximating the risk posed by a site may be affected. For this reason, if the site is rescored taking the response actions into account, the drop in score that may result might not reflect a commensurate reduction in the level of risk presented by a site.

For example, the factor of hazardous waste quantity, when considered with other factors that predict the toxicity of the substances and the likelihood of release, helps predict how extensive the harm from a release can be. For a site that has been in existence for some time, however, hazardous substances may already have begun migration toward ground water or surface water. If the hazardous materials on the surface are then removed, and the site is scored according to conditions existing after removal, the site would be assigned a negligible value for waste quantity, even though substantial amounts of the material may still be under the site and a potential threat to the public health.

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her example is where some of the l population at risk has been ed with alternative drinking water s. In such a case, the population factor might be rescored quite ven where the alternative supplies nporary, costly, or limited in . In addition, rescoring in this on could penalize residents for ng alternative supplies by ng the priority of the site or g it from the list and thereby ding completion of proper ial actions. A final reason is that se action at sites is an ongoing ss, and it may become unduly nsome to continually recalculate s to reflect such actions.

ere response actions have already initiated by private parties or er agency, listing such sites will e EPA to evaluate the need for a complete response. Inclusion on PL therefore does not reflect a nent that responsible parties are g to address the problems. The cy believes, therefore, that this oach is appropriate, and consistent the purpose of the NPL as stated in gislative history of CERCLA.

Small Observed Release. Some commenters maintained that EPA incorrectly assigned values for observed releases to ground waters because the measured concentrations of the substances involved were below the regulatory limits specified under the Safe Drinking Water Act. The HRS states:

> If a contaminant is measured (regardless of frequency) in ground water or in a well in the vicinity of a facility at a significantly (in terms of demonstrating that a release has occurred, not in terms of potential effects) higher level than the background level, then . . . a release has been observed (NCP, Appendix A, § 3.1, 47 FR 31224, July 16, 1982).

This scoring instruction is based on the fact that the observed release factor is considered for purpose of estimating the likelihood that substances can migrate from the site. When a release is observed in any quantity, as long as the concentration is above background level, that likelihood is 100 percent, and this factor receives the maximum score of 45. The observed release factor is not intended to reflect the level of hazard presented by the particular release observed. The hazard presented is, rather, approximated by the total score, incorporating the observed release factor indicating the likelihood of migration with other factors such as waste quantity, toxicity, and the persistence of the substance. These combined factors are indicative of the possibility of future releases of much higher amounts. Furthermore, concentrations of substances migrating in the environment tend to show extreme variation through time and space. Given that only periodic sampling is feasible in most instances, requiring contaminants to exceed certain levels before assigning an observed release could exclude many sites from the NPL which may be endangering the public. The rationale for this approach is further discussed in the preamble to the NCP (47 FR 31188 (July 16, 1982)).

Summary of Score Changes. A summary of the 144 sites where EPA's review of comments and new data resulted in a final score that changed from the score as originally proposed is shown in the table below:

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REFERENCE 2

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CITIZEN PARTICIPATION PLAN

Garvies Point
Glen Cove, New York
Site No. 130032

7/17/89

Prepared By:

Fred C. Hart Associates, Inc.
530 Fifth Avenue
New York, New York 10036

July 17, 1989

(1823n-27)

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4.H6

1.0 INTRODUCTION

The Garvies Point Condominium Site (hereinafter referred to as the site) is located in Glen Cove, New York at the end of Garvies Point Road. A location map of the site is presented in Figure 1-1. The site is bounded by Glen Cove Creek to the south, Hempstead Harbor to the west, the Garvies Point Preserve to the north and the Glen Cove Anglers Club to the east. A site map is presented in Figure 1-2. The total area of the site encompasses approximately 19 acres, including a section of wetlands along Glen Cove Creek.

The New York State Department of Environmental Conservation (NYSDEC) placed this site on the state's list of inactive hazardous waste disposal sites on January 7, 1986. At that time, the site (No. 130032) was assigned a rank of 2a which is a temporary classification given to sites that have inadequate and/or insufficient data for inclusion in any of the other classifications. The current owner of the site, Village Green Realty at Garvies Point, Inc. was requested by the NYSDEC in 1985 to conduct field investigations to determine if inorganic and/or organic constituents were present in different environmental media at the site. The initial test results of that investigation prompted the NYSDEC to change the classification of the site to a 2, which requires immediate action.

As a result of placement on the state's inactive hazardous waste disposal site list, Village Green Realty at Garvies Point, Inc. (Respondent) has entered into an Order on Consent with New York State Department of Environmental Conservation (NYSDEC). This Order on Consent calls for the development of a Remedial Investigation (RI) Work Plan, implementation of that Work Plan, preparation of an RI report and a subsequent scope of work for an engineering study of feasible remedial alternatives. The goals of the RI, as set forth in the order, are to determine health and environmental hazards, if any, in connection with the site; and to identify all areas of soil and water contamination at the site.

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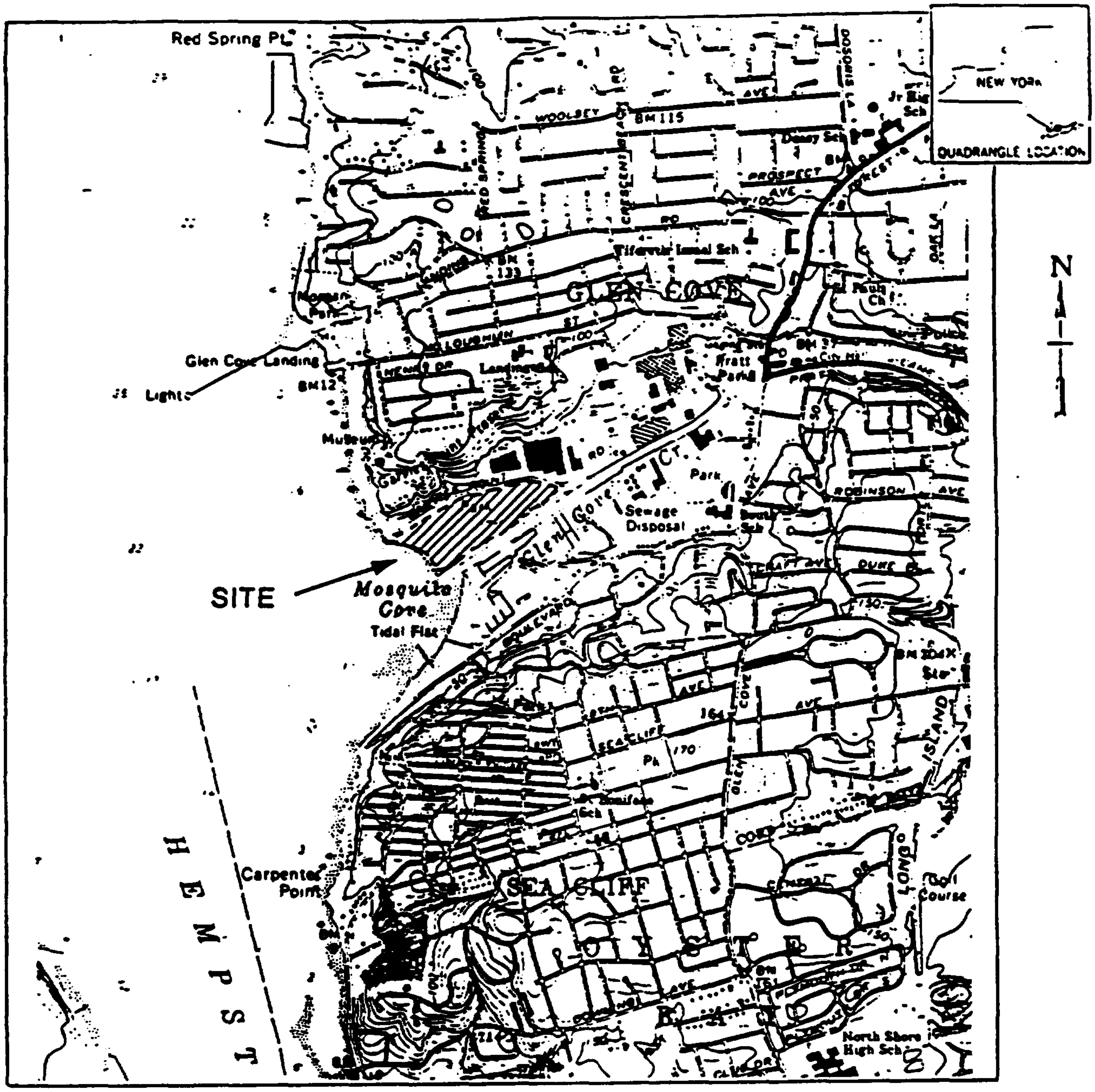

0 1000 2000 3000 4000 5000 6000

SCALE FEET

SOURCE : U.S.G.S. MAP, SEA CLIFF QUAD

FIGURE 1

SITE LOCATION MAP

GARVIES POINT
GLEN COVE, NY

EBASCO SERVICES, INC.

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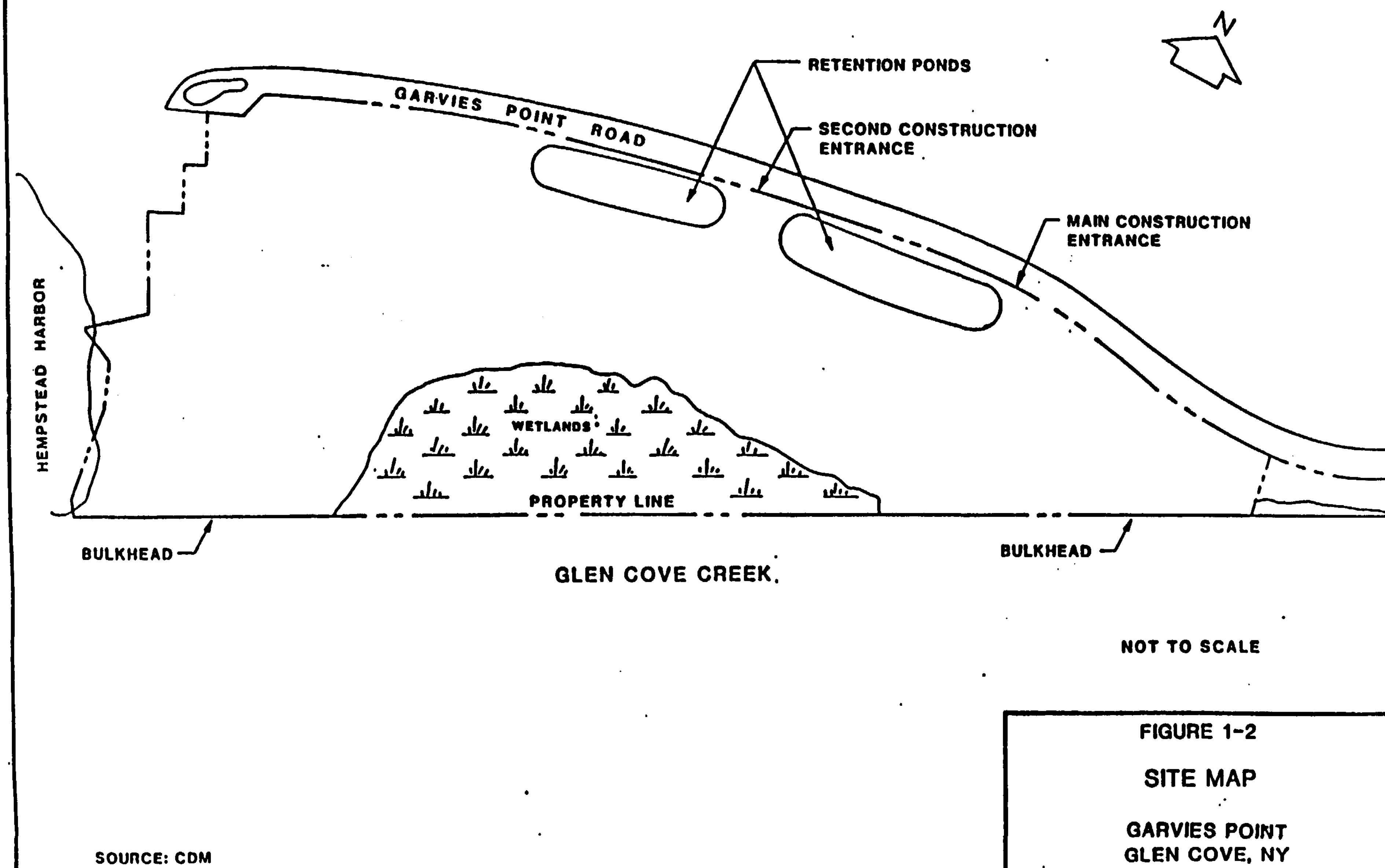

FIGURE 1-2

SITE MAP

GARVIES POINT
GLEN COVE, NY

FRED C. HART ASSOCIATES, INC.

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As part of the Remedial Investigation, Village Green Realty at Garvies Point, Inc. will also conduct a citizen participation program. This program will promote an understanding of the remedial activities at the site and will provide an opportunity for the collection of public information that will enable Village Green Realty at Garvies Point, Inc. to develop a comprehensive remedial program which is protective of both public health and the environment.

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2.0 SITE HISTORY

2.1 Ownership

The history of site ownership was determined by searching Nassau County property records. The record search conducted by RTP Environmental Associates, Inc. (RTP) determined that recorded deeds to the property date back to 1899 when much of the site and surrounding Glen Cove Creek was assigned to Nassau County. A chronology of the owners is presented in Table 2-1. As indicated in Table 2-1, there has never been an industrial owner of the property except for The CONMAR, Inc. Group. This group purchased the property in 1979 with the intent of constructing a residuals transfer station on a portion of the eastern third of the site. The residuals were to be accepted from surface transports and transferred to barge transports docked in Glen Cove Creek. Although preliminary plans were developed, no such facility was ever constructed.

2.2 Dredging Activities

The United States Congress authorized the United States Army Corps of Engineers (USACE) to maintain Glen Cove Creek in 1925. Local government was to pay half of the costs and provide an acceptable disposal site for the dredge materials. The initial dredging took place from August 1933 to May 1934. The creek was dredged from Mosquito Cove in Hempstead Harbor for a length of approximately 0.7 miles upstream to a width of 100 feet and depth of 8 feet. The remaining 0.3 mile upstream portion to the head of navigation was dredged to a width of 50 feet and depth of 8 feet. A total of 195,000 cubic yards of material were removed. There are no available records regarding the disposal site for this material.

The channel has been dredged an additional three times since the initial work in 1933 and 1934 was done. In 1948, 26,500 cubic yards were removed but there are no available records to indicate where this material was disposed. In 1960, 27,100 cubic yards were dredged from the lower portion of Glen Cove Creek. According to information available from the USACE, this material was disposed of on the Garvies Point site. Finally,

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TABLE 2-1

GARVIES POINT SITE OWNERSHIP HISTORY

Lot #	Owner	Deed Date
26 & 27	Wm. H. Seaman	9/21/09
(later redesignated)		
424 & 546	E.S. Appleby, et al.	*
	City of Glen Cove	6/26/31
	Realty Assoc.	9/13/46
	John White	10/14/47
	Ridgewood Platear	10/4/49
	Realty Assoc.	10/5/49
	Glen Cove Realty Corp.	12/12/51
	J. Graham	01/10/56
	Creek Develop. Corp.	12/20/56
	I.I. Miller	12/22/56
	City of Glen Cove	02/13/58
	Nassau County	04/28/70
	City of Glen Cove	09/13/74
	I.I. Miller	11/19/74
	Lee Langbaum	09/02/76
	CONMAR Blders.	03/26/79
	James O'Connell	12/28/79
	Glen Cove Development Corp.	04/16/81
	Village Green	08/15/83
551 & 556	(same as 424 and 546 prior to 1977)	
	Glen Cove Urban Renewal	04/12/77
	Glen Cove Community Development	04/16/81
	Village Green	10/04/83

* Deed date not in records

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6,300 cubic yards were dredged in 1965 and reportedly also disposed of on the site. The approximate disposal area for material removed in 1960 and 1965 is shown in Figure 2-1.

An USACE proposal to dredge Glen Cove Creek in 1979 was not implemented. Certain analytical tests conducted in sediment samples from the creek indicated a potential for the creek sediments to release PCBs, iron, and cyanide in concentrations greater than was currently present in the receiving water body (Glen Cove Creek). The 1979 proposal by the USACE included disposal of the dredge materials on the site. However, the NYSDEC prohibited this land disposal option after the dredge material was deemed to be hazardous.

2.3 Landfilling Operations

According to Nassau County Department of Health (NCDOH) records, the City of Glen Cove used the site as a municipal sanitary landfill beginning in 1971. Incinerator residues, wastewater treatment plant sludges and street debris were disposed of at the site. However, use of the site as a disposal area may have begun earlier. During the early years of city ownership, the records show that complaints had been received by the county. These complaints were related to the burning of rubbish at the site and to odors allegedly coming from uncovered sewage sludge. The City of Glen Cove was responsible for the site and occasionally cleaned and removed debris from the site.

RTP reports that the landfilling activities at the site were corroborated by Mr. Donald Aitken, a former NCDOH sanitarian who was responsible for periodically inspecting this and other landfills. Mr. Aitken explained that to his knowledge, household debris was disposed of in the western section of the landfill. The primary area of landfilling occurred in the central section of the property. The garbage consisted of typical household garbage, construction debris, catch basin sediments and sludge from the City sewage treatment plant. Mr. Aitken was unsure of the exact boundary of the eastern border of the landfill. He did acknowledge that at one time a 20 foot high sand berm existed along

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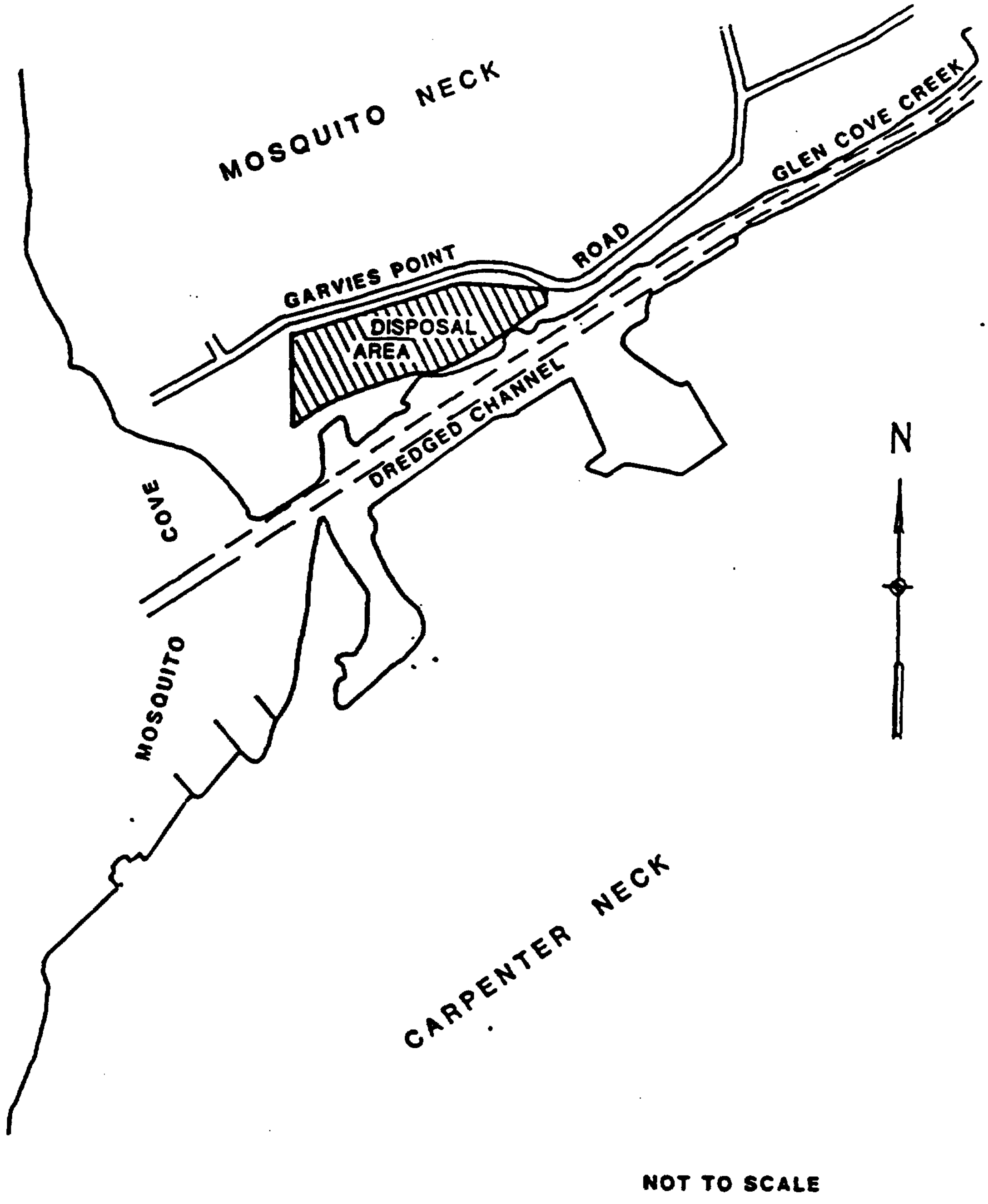

SOURCE: U.S. ARMY CORPS OF ENGINEERS

FIGURE 2-1

DISPOSAL AREA FOR MATERIAL DREDGED FROM GLEN COVE CREEK IN 1960 AND 1965
GARVIES POINT
GLEN COVE, NY

FRED C. HART ASSOCIATES, INC.

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the northern border of the site. This berm was subsequently leveled and graded after 1983. A soil berm also existed along the southern border of the site. Mr. Aitken did not recall any incidents of industrial or potentially hazardous waste or ash disposal at the site. He also stated that the landfill was still active into the early 1980s just prior to the purchase by Village Green Realty at Garvies Point, Inc.

In NCDOH records dating back to 1973, references are made to the disposal of incinerator ash, sewage sludge, household debris and other sanitary fill on various portions of the site. Prior to about 1975, the discarded debris in the landfill was burned, apparently to reduce the volume of the discarded materials and for rodent control. There are no available records describing where these disposal operations took place. However, based on topography and the aerial photographs, it appears that the center of the current site was the primary disposal area.

2.4 Site Activities After 1983

The property was purchased by Village Green Realty at Garvies Point, Inc. in the fall of 1980. Since that time, bulkheads have been built along Glen Cove Creek and the western end of the site bordering Hempstead Harbor. The bulkheads were backfilled with clean fill. Approximately one third of the distance along Glen Cove Creek was not bulkheaded in order to preserve an estuarian habitat. Two lined retention ponds were constructed near Garvies Point Road. The purpose of the ponds is to collect surface runoff and allow solids to settle out of the water before the water is released to Glen Cove Creek. The intent of the liners in these two ponds is to prevent infiltration of stormwater into the subsurface which may be comprised of landfill materials.

Both wooden and concrete piles have been driven into the subsurface over much of the site. The purpose of these piles is to provide structural integrity to residential units planned for the site. There are currently two residential units whose frames have been constructed in the eastern portion of the site. The construction of these units was suspended by the developer. These framed residential units include

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elements of a gas collection system which had been had specified prior to construction. Finally, a stockade and chain link fence exists along the northern and eastern site boundaries.

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3.0 PROJECT DESCRIPTION

3.1 Objectives of Remedial Investigation

The property was purchased by Village Green Realty at Garvies Point, Inc. in 1980 with the intention of developing a residential complex on the site. Village Green Realty at Garvies Point, Inc, in the spirit of cooperation and without admitting liability for the disposal of industrial or hazardous waste at the site, has consented to enter into and carry out the elements of the Order on Consent with New York State Department of Environmental Conservation (NYSDEC). The goals of the RI, as set forth in the order, are to determine health and environmental hazards, if any, in connection with the site; and to identify all areas of soil and water contamination at the site.

In addition to the RI, a radiological survey of the site will be conducted. This survey is described in a separate work plan and will be conducted prior to the start of the RI field activities. The goals of the survey are to assess the potential hazard from radioactive materials, if any, deposited at the site by local industries. The amount of radiation above the ground surface will be measured with hand held radiation detecting instruments. If above background readings are measured on the instruments, up to ten samples will be collected for laboratory analysis.

3.2 Description of RI Activities

3.2.1 Aerial Photograph Review. HART will review aerial photographs taken of the site from 1950 through 1986 to define the locations of potential dredge and/or landfill materials and to observe any topographical changes at the site.

3.2.2 Preparation of Site Topographic Map. Since there is no topographic or scaled base map available for the site, a survey company will be subcontracted to prepare such a map. The map will be constructed on a scale of one inch equal to 100 feet at an appropriate contour interval.

3.2.3 Surface Water and Sediment Sampling. In order to characterize the surface water and sediment at Garvies Point, samples will be collected from the two retention ponds and the pipe that discharges from these ponds to the creek. The ponds collect surface water and sediment drainage from the entire site and are therefore representative of the site as a whole. In addition to these three sample locations, two surface water and two sediment samples will be collected from seeps noted on the southeastern slope of the site, adjacent to the wetlands area. These samples will be analyzed for Target Compound List (TCL) and Target Analyte List (TAL) constituents. These samples will provide the most accurate indication of the concentration of any compounds leaving the site and entering the creek.

3.2.4 Wetlands Sampling. In order to evaluate any potential impact of the site on the adjacent wetlands, five sediment samples will be collected from the wetlands. The samples will be collected during low tide when the maximum amount of wetlands area is exposed. These samples will be analyzed for TCL organics and the inorganics.

3.2.5 Air Sampling Program. Two different air sampling techniques will be used to determine the presence of any subsurface soil gas at the site. The first method will entail the collection of vapor samples from shallow holes in the ground approximately 3 feet deep and 3/8 inch in diameter. These vapor samples will be screened in the field to determine locations where vapor samples will be collected for laboratory analysis. Collection of the second set of soil vapor samples will require inserting a hollow probe approximately two feet into the ground and then pumping soil vapor through the probe and into sample tubes. Approximately eight (8) samples will be collected for laboratory analysis. Ambient air (upwind and on-site) will also be analyzed during this program. The laboratory results will permit calculation of surface emission rates for any volatile organic compounds detected.

3.2.6 Shallow Test Boring Program. A total of 13 shallow borings will be drilled at the site to gather additional data regarding the nature of potential organic and inorganic compounds in the soil fill area. These

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borings will also provide lithological information to delineate the lateral continuity of the clay layer at the site. Up to ten samples will be collected from each boring and these samples will be tested in the field for pH, conductivity and volatile organics to determine which should be submitted for laboratory analysis. Up to nineteen samples will be selected from the borings for analysis.

3.2.7 Shallow Monitoring Well Installation. Up to six shallow monitoring wells will be installed at the site, which in combination with the existing four wells at the site will provide the necessary data to define the vertical extent of potential groundwater contamination at the site. The monitoring program will also focus on characterizing upgradient or off-site organic and/or inorganic contamination. Groundwater samples will be collected from all ten shallow wells and submitted for laboratory analysis.

3.2.8 Deep Test Boring Program. The objective of the deep boring program is to evaluate more fully the connection between the fill material above the clay layer and the fill material found along the bulkhead on the southeastern, and possibly the southwestern, side of the site. In addition, an attempt will be made to determine the thickness of the clay layer along the northwestern side of the site. Soil samples of the fill material will also be collected from two of the three borings for TCL and TAL analysis. Depending upon the results of the boring program, up to three of these borings may be finished as monitoring wells.

3.2.9 Deep Monitoring Well Installation. Depending upon the results of the deep test boring program, one of several objectives may be accomplished by installing deep monitoring wells at the site. If all three wells are installed, both horizontal and vertical hydraulic gradients at the site may be assessed as well as the quality of deeper water bearing zones. If no water bearing zone is found at the upgradient well location within fifty feet of the surface and only two wells are installed, only vertical hydraulic gradients at the site may be assessed. The two deep wells will be sampled to assess groundwater quality at depth in the fill material near the bulkhead. However, the data will have to be interpreted carefully since no upgradient data will be available.

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*** D R A F T ***

REMEDIAL INVESTIGATION
WORK PLAN
GARVIES POINT CONDOMINIUMS
GARVIES POINT ROAD
GLEN COVE, NASSAU COUNTY

MARCH 1988

Prepared By
RTP Environmental Associates, Inc.
and
Fanning, Phillips, and Molnar

DRAFT

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*** D R A F T ***

REMEDIAL INVESTIGATION
WORK PLAN

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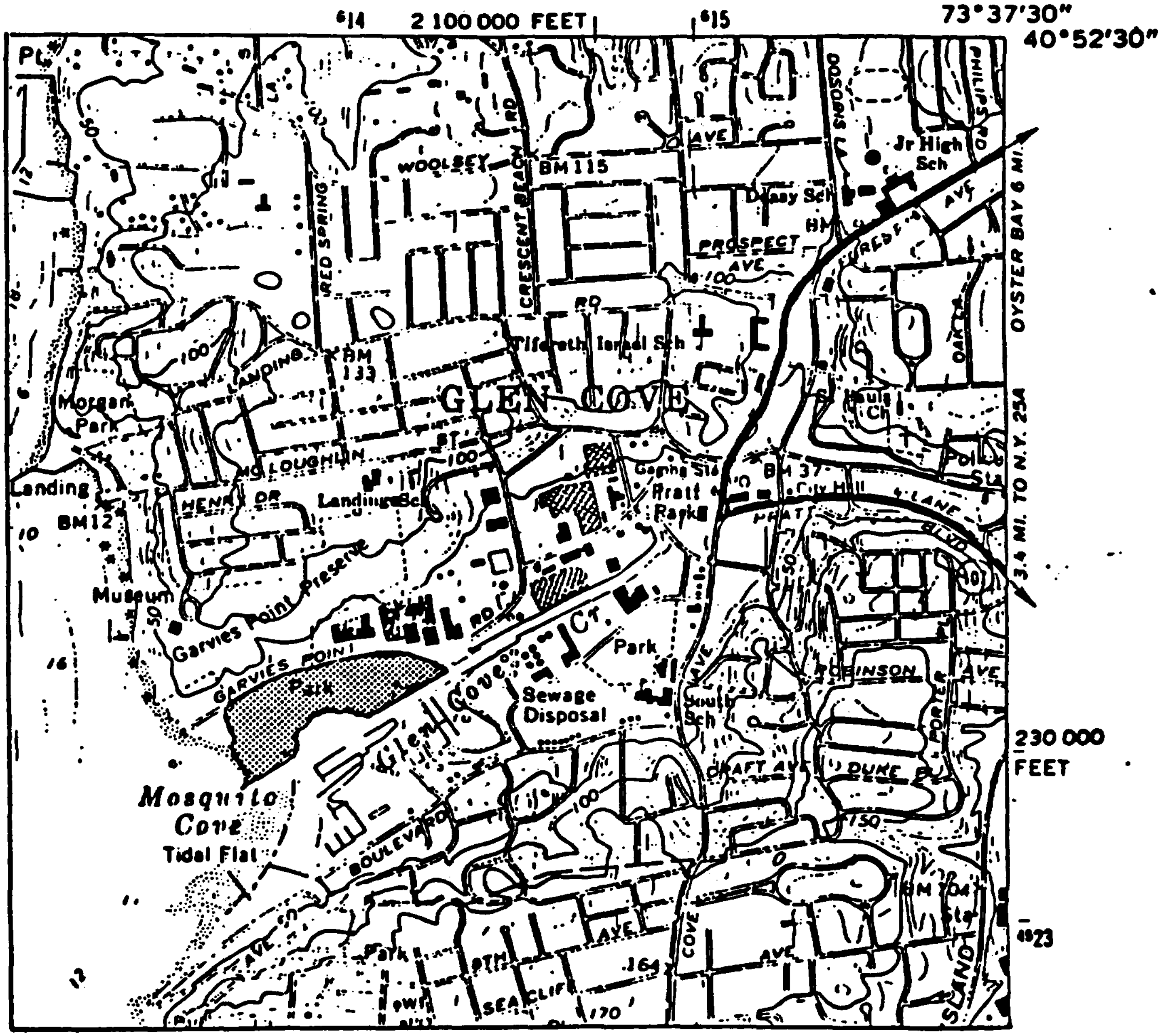
1.0 INTRODUCTION

The Garvies Point Condominium Site is located in Glen Cove, New York at the end of Garvies Point Road. The site is bounded by Glen Cove Creek to the south, Hempstead Harbor to the west, the Garvies Point Preserve to the north and the Glen Cove Anglers Club Marina to the east. The site is shown on Figures 1.1 and 1.2 As outlined in Figure 1.2, the site consists of approximately 19 acres, which includes a section wetlands along Glen Cove Creek.

The current site owner, Village Green Realty at Garvies Point Inc. has entered into a Order On Consent on the Garvies Point Condominium Site with the New York State Department of Environmental Conservation (NYSDEC) under Article 27, Title 13 of the Environmental Conservation Law (ECL) of the State of New York. Formerly the site was owned by the City of Glen Cove and a portion of the site was used as a landfill by the City of Glen Cove.

In 1985, the site owner by request of the NYSDEC performed a preliminary site investigation to determine if hazardous wastes were located on site (CDM, 1986). The site investigation determined that hazardous materials were present and the NYSDEC then reclassified the site as an inactive hazardous waste disposal site as that term is defined in Section 27-1301 (2) of the ECL. The site number designation under the ECL is No: 130032. Furthermore, the NYSDEC stated in the Order On Consent that the hazardous and industrial substances, hazardous waste constituents and toxic degradation products thereof, at and in the vicinity of the site constitute a significant threat to the environment. Pursuant to ECL 27-1313 (3)(a) the Commissioner of Environmental Conservation may order the owner of such a site and/or any person responsible for the disposal of hazardous wastes at such site (1) to develop an inactive hazardous waste disposal site remedial program and (2) to complete such a program within reasonable time limits.

SEA CLIFF QUADRANGLE
NEW YORK
7.5 MINUTE SERIES (TOPOGRAPHIC)



GARVIES POINT SITE

FIGURE 1.1: PROJECT SITE AND SURROUNDINGS

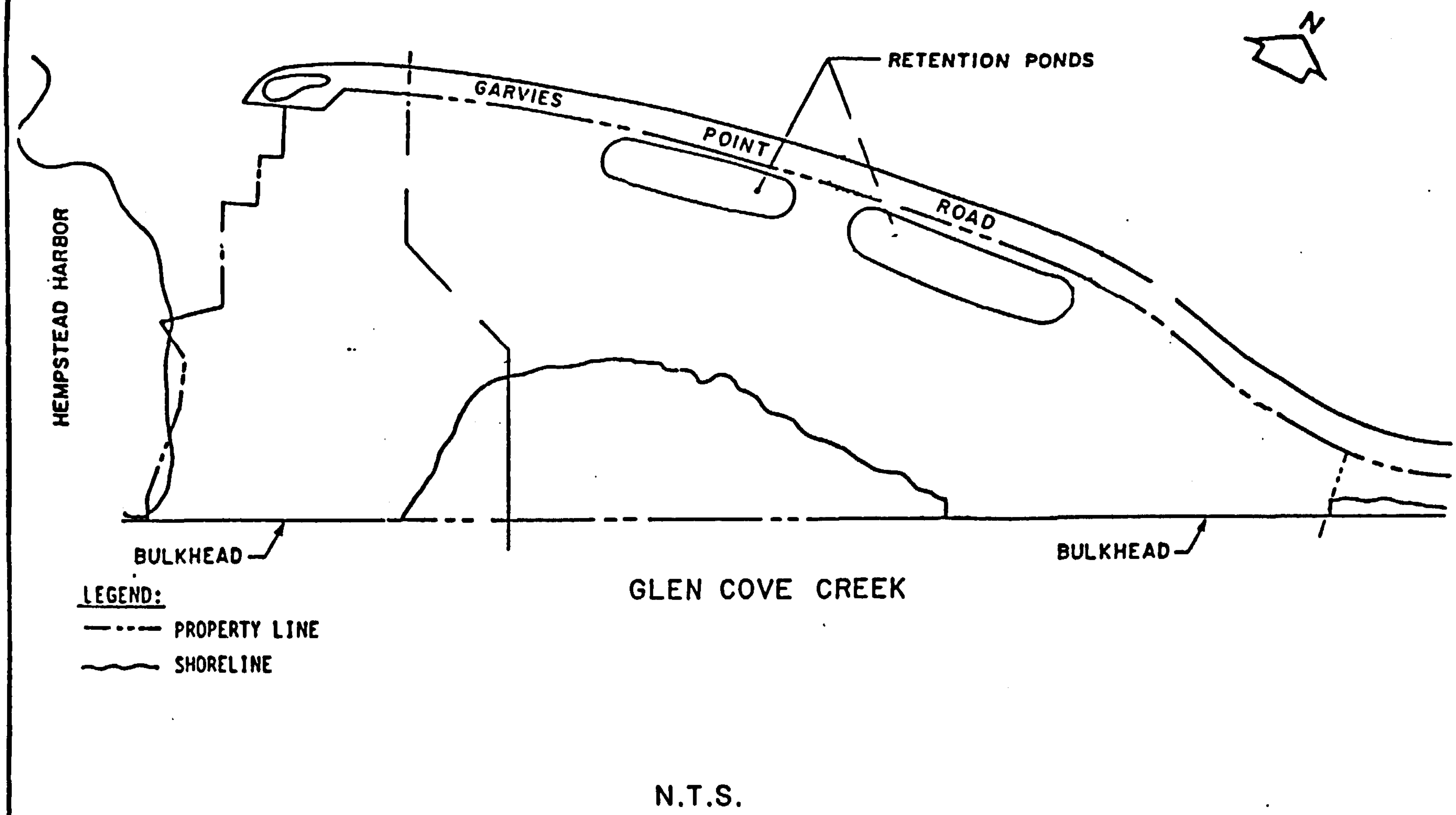


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FIGURE 1.2 – GARVIES POINT SITE MAP

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The Commissioner has so ordered Village Green via the Order On Consent effective ______________.

The goals set forth in the Order On Consent are: (1) determine the health and environmental hazards and potential hazards in connection with the site and (2) identify all areas of soil and water contamination at the site.

In response to the Commissioner's Order, Village Green Realty has developed this work plan to accomplish the goals stated above.

This work plan is comprised of several sections. In summary the plan consists of a site reconnaissance, sampling and analysis plan, investigation protocols, quality assurance and control, health and safety procedures and reporting protocol. In preparing and completing this work plan, Village Green Realty, its consultants and assigns do not admit liability for the disposal of industrial or hazardous substances at the site. Such liability must be the acknowledged responsibility of the former owners of the site and any claims for damages or otherwise, therefore, are their responsibility.

2.0 OBJECTIVE

The objective of the remedial investigation is to provide additional data on site characteristics including the characteristic, location, quantity and quality of any hazardous materials on-site and the potential for on-site materials to enter air, soil and water media pathways. These data will be used in the feasibility study for the site to determine the measures necessary to fully and safely remediate any potential hazards found.

The ultimate objective of the proposed remedial investigation (RI) is to provide information on the nature and extent of materials on-site so that an effective remediation program can be implemented. The completion of the remediation will allow the issuance of a clean bill of health for the site. Subsequent to the issuance of the clean bill of health, the applicant fully intends to develop the site as a residential condominium development.

3.0 HISTORICAL INFORMATION SUMMARY

3.1 Site Reconnaissance

Site reconnaissance has been conducted by several groups including the NYSDEC. The previous site investigations have also been conducted as noted in Appendix A. Because of the nature of area, its former use as a municipal landfill and dredge spoil disposal area, and the significant amount of alteration that has occurred subsequently, the approach taken in this work plan will be to cover the area with additional observation wells, soil borings and air samples to fully characterize the site and to some extent the adjoining area of Glen Cove Creek.

Aerial photographs showing the local land use, adjoining sites, the City of Glen Cove Codisposal Plant and other industrial sites are included in Appendix A. A detailed site reconnaissance map will be developed and discussed for inclusion into the RI document.

3.2 Previous Site Studies

Lockwood, Kessler and Bartlett (LKB) (LKB, 1985) have prepared an engineering report on the site. The report contains data on soil profiles across the site as well as other information on-site geophysics. Relevant sections of the LKB report are included as Appendix B. Data are also presented on the test borings done on-site.

A Camp Dresser & McKee (CDM) (CDM, 1986) report provides data on several groundwater wells, soil profiles, metal concentrations and other site characterization data. These data have been used in developing the proposed supplementary sampling and analysis plan presented in the following section. Relevant sections of the CDM report are included in Appendix B.

The Camp, Dresser and McKee report (CDM, 1986) discussed the results of samples from twenty shallow soil borings (2 foot deep), four deep borings (15 foot deep) and four groundwater monitoring wells. Figure 3.1 from the CDM report (attached for reference) shows the locations of the twenty shallow soil samples, the four 15 foot boreholes and the four observation wells.

The CDM shallow soil samples were analyzed for HSL-CLP metals. The composite soil samples from the 15 foot deep borings were analyzed for HSL - inorganics, pesticides, PCB's and cyanide. The four soil observation well samples were analyzed for HSL-CLP volatiles, base neutral and acid extractables and inorganics.

The results of each CDM shallow soil sample were averaged together to develop an average concentration for each metal to provide a basis for identifying the highest values. Six sampling locations contained metals whose values were elevated. These six locations, are in two clusters, one cluster contains CDM samples S04 and S05 and the other cluster contains CDM sample S02, S10, S11 and S12.

The results of the four 15 foot deep borings show many metal concentrations at or below the detection limits. Two of these borings showed elevated metal concentrations in the top soil layer, in the zero to six foot composite (CDM#B3 and CDM#B4). These have the most number of metals exceeding the shallow soil average. Borings 3 and 4 are in the cluster area of CDM shallow soil samples S02, S10, S11 and S12 where higher than average metals were detected. Cyanide was not detected in the deep borehole samples at any depth.

Aroclor 1248 was present but below detection limits in all but two CDM deep borehole samples. The highest Aroclor level was detected at borehole CDM#B1 at 7.5 - 9 feet. Some pesticide compounds were present below detection

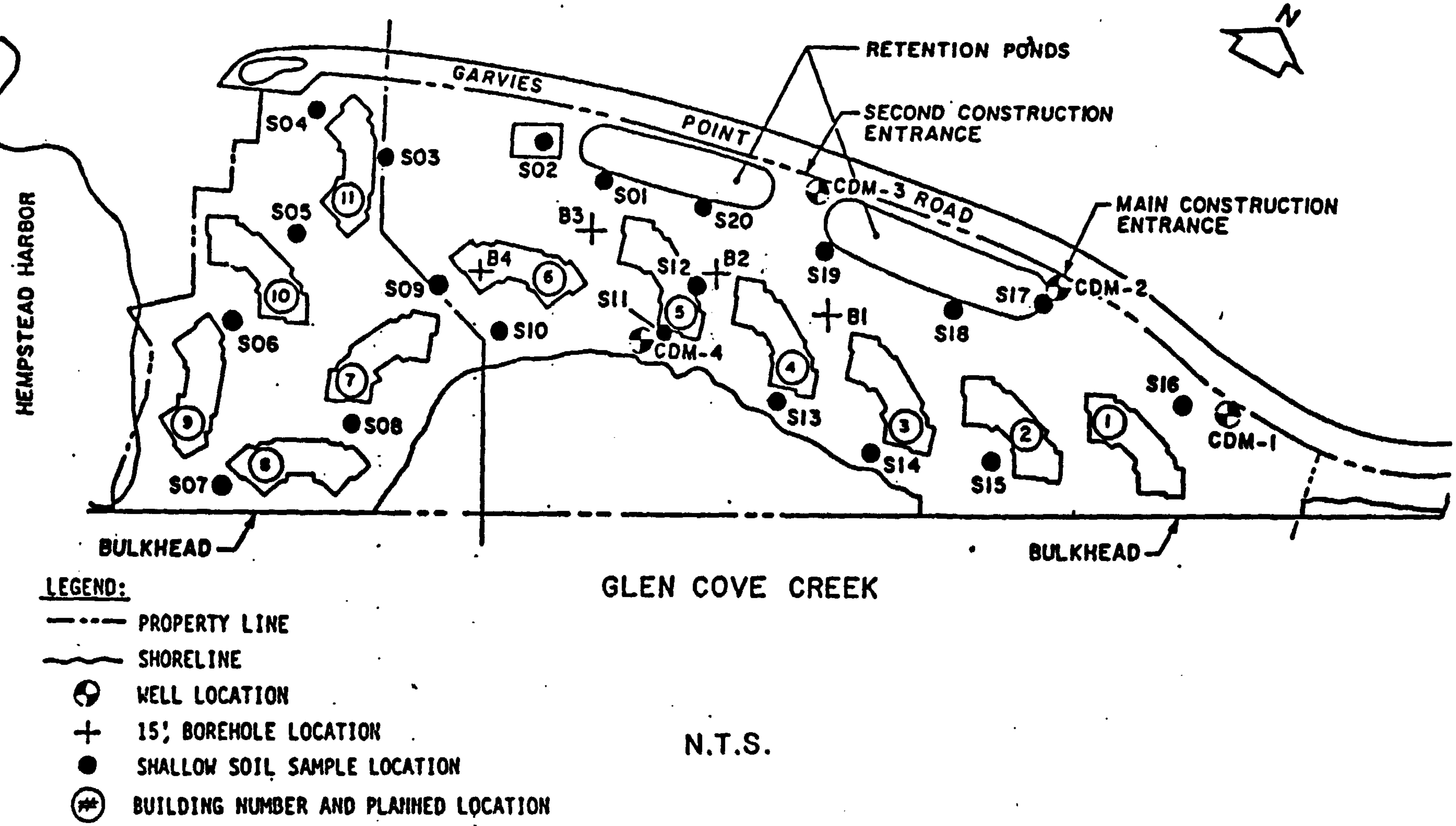

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FIGURE 3.1 - CDM SAMPLE LOCATION MAP

limits including 4-4' DDD and chlordane. Although relatively low, the highest pesticide concentration was for chlordane at borehole CDM#B1 at the 7.5 -9 foot depth. These low levels should be further delineated.

The results of the CDM aqueous analysis show volatile organic compounds present at CDM Well #2. The other three CDM wells contained concentrations of volatile organics below the detection limits or below values which were found in blank samples. CDM Well #4 contains detectable concentrations of benzene, phenol and bis (2-ethylhexyl) phthalate. An analysis of the groundwater samples also showed unidentified compounds in detectable unquantifiable concentrations (predominantly at CDM Well #4). The CDM report stated that the high levels of organics at CDM Well #2 may be due to off site sources based upon the well's location and measured water gradients.

The highest aqueous metal concentrations were found in CDM Well #4. However, all CDM water samples were unfiltered and were preserved in the field prior to transport to the laboratory for analysis. This procedure dissolves all metals in particulate form and represents unrealistically high values for true dissolved metals in the groundwater. No cyanide was detected in the CDM aqueous samples.

In summary, the CDM shallow soil analysis identified two areas of high metal concentrations. The deep boring samples identified PCB and pesticide compounds at low levels at CDM Well #2. Metal compounds were identified in all aqueous samples with the highest levels at CDM Well #4. Unidentified base neutral extractable compounds were detected in the aqueous samples. Phenol and bis (2-ethylhexyl) phthalate were detected at CDM Well #4. Cyanide was not detected in the soil or the groundwater on site.

The proposed sampling plan, as discussed in the following Section 4.0, will address and expand upon the CDM report. Compounds identified by CDM's soil sampling analysis will be included in the proposed soil sampling analysis. These compounds include HSL-metals, pesticides, base neutral and acid extractables; PCB's, phenols and cyanide. Selected samples will be analyzed for HSL volatiles. Aqueous parameters identified in the CDM report and included in the proposed sampling plan include HSL-metals, base neutral and acid extractable volatile fraction, phenols and cyanide. Even though cyanide was not detected on site, it is included in the proposed sampling plan because of the history of the dredge spoil disposal on site as discussed in Section 3.7.

3.3 Aerial Photography

As described in Appendix A, aerial photographs for the site are available from 1950 through 1986. Photo reprints of the available photography will be provided in the RI document. A review of the aerial photographs is provided in Section 3.7. The aerials indicate areas of filling that had occurred on-site during the various periods noted up to 1966, the period covering the last known deposition of dredge spoils from Glen Cove Creek on the site. A complete analysis of existing photographs will also be provided in the RI.

3.4 Site Map

A site map and plot plan of the Garvies Point Condominium Site will be developed through ground survey methods and will include significant surface, topographic and structural features and the establishment of an on-site benchmark.

3.5 Regional Hydrology, Hydrogeology and Climatology

The regional hydrogeology and geology will be presented referencing the appropriate USGS and other relevant data. Area drainage basins and patterns including surface water hydrology will be addressed. Tidal effects and water table fluctuations at the site will be referenced. Local climatic conditions and meteorological factors including precipitation and their effects upon the site will be compiled. Data from local National Weather Service stations will be used in the RI analysis.

3.6 Public and Local Water Supply Wells

All potable and water supply wells within a one mile radius of the site will be mapped on a scaled base map and presented in tabular form.

3.7 Previous Dredging Activity

Historic records of the dredging and spoil disposal activities at Glen Cove Creek were reviewed at the Army Corps of Engineers, Navigation Section, New York District Office in New York City. Mr. S. Lew of the Navigation Section provided the files. The primary concern was the disposal of dredge spoils on the site property, the origin of the dredge spoil and their characteristics.

Based upon the existing records, dredging of Glen Cove Creek occurred in 1948, 1960 and 1965. An April 1933 map of Glen Cove Creek (Figure 3.2) obtained from the U.S. Engineers Office, First District New York City shows dredge spoil disposal areas which implies pre-1948 dredging activity. Although unconfirmed, there is a strong likelihood that such dredging did occur since the Army Corps significantly modified the original course of Glen Cove Creek from the trajectory shown in Figure 3.2 to the current straight line trajectory.

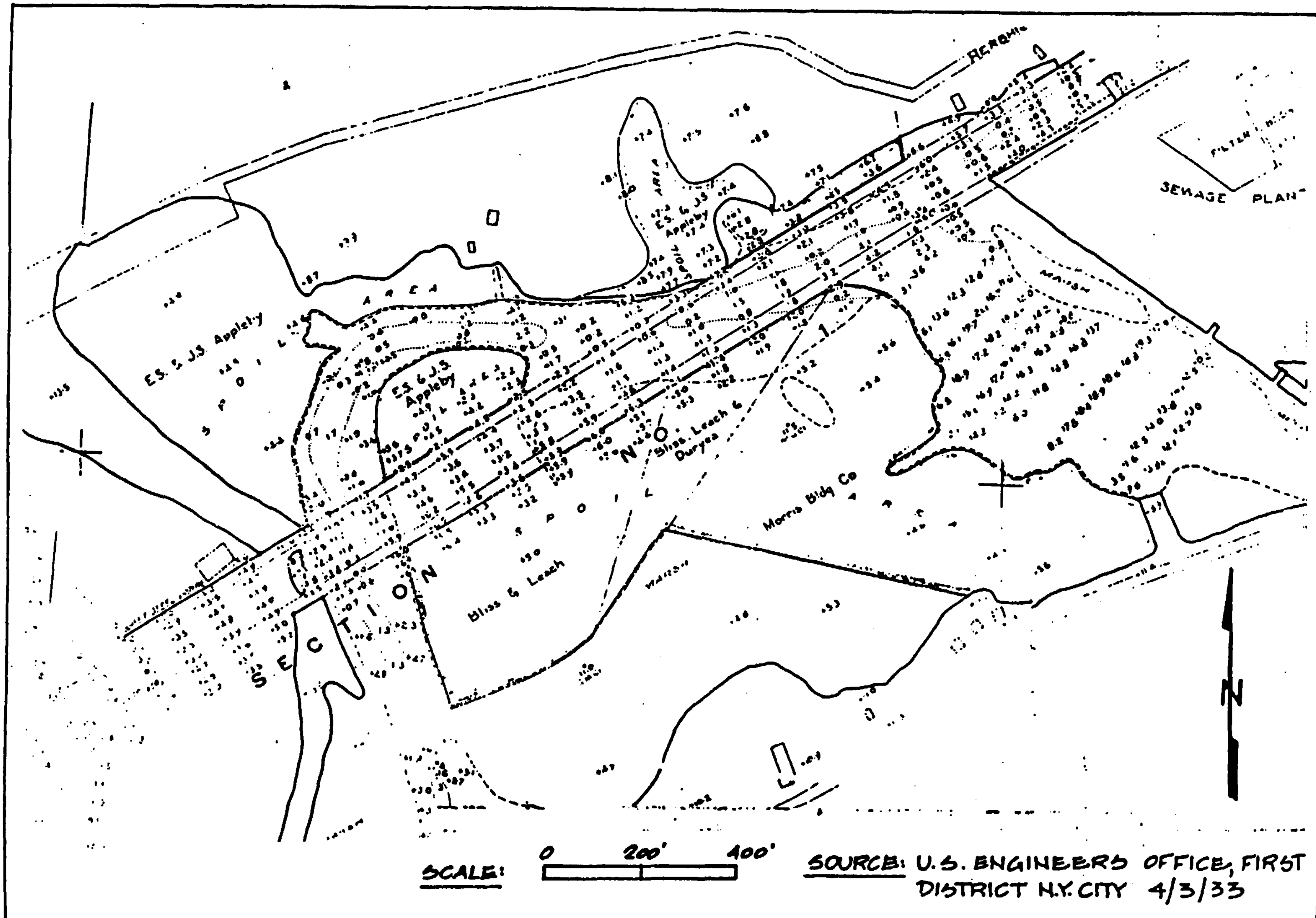

FIGURE 3.2 - GLEN COVE CREEK DREDGING ACTIVITY 1933

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In the 1948 records of dredging activity, it was proposed that the volume of dredge material to be removed was 29,500 cubic yards. No maps of the actual dredging or spoil disposal areas were in the file. Estimates of the disposal areas were approximated from the 1950 aerial photographs.

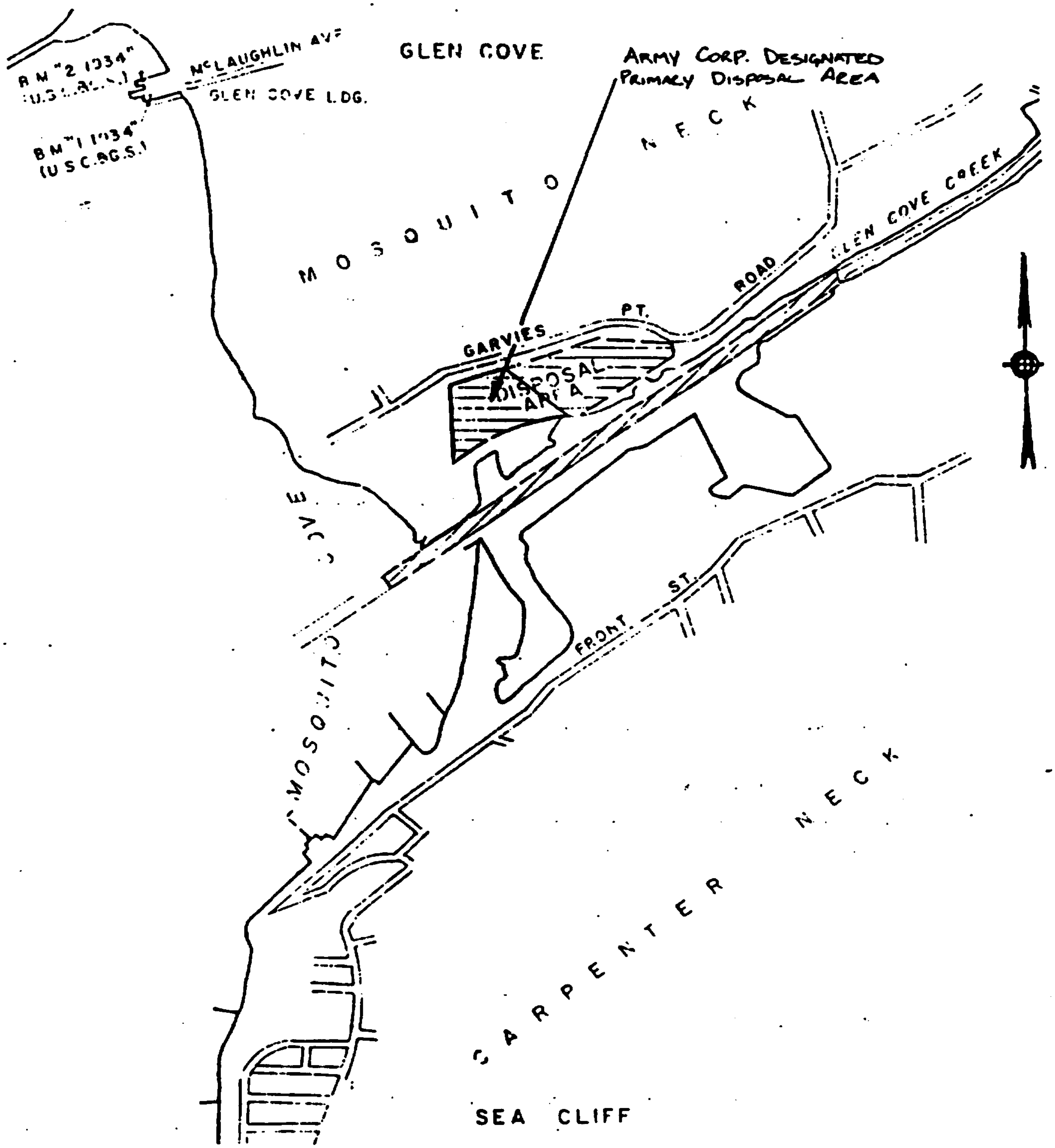
A review of the 1960 records revealed that the proposed volume of dredge material to be removed was 27,600 cubic yards.

The area to be dredged and the dredge spoil disposal area from the U.S. Army Corps of Engineers dated 4/1/60 are shown in Figures 3.3. The central and eastern sections of the property are designated as the disposal areas.

A review of the 1965 Army Corps records shows that dredging took place and the proposed dredge spoil disposal area was in the center of the site, Figure 3.4. The area to be dredged was approximately where Glen Cove Creek discharges into the Harbor.

The proposed 1979 dredging activity shown in Figure 3.5 did not occur. The reasons given were that the upstream area of the creek was not properly bulkheaded for dredging activity. Additionally, a sediment sample of the creek obtained by the EPA showed levels of cyanide above regulatory guidelines. It must be assumed the sample showing the contamination was taken from the area to be dredged, although no specific location or number of samples was provided. The NYSDEC subsequently declared the proposed dredge spoils as a hazardous waste and prohibited disposal of the material in the landfill at the Garvies Point Site. Alternative disposal sites were investigated, however, dredging did not occur because other disposal areas were cost prohibitive (Appendix C). - missing

A composite sketch of the dredging activity and placement on the site has been provided in Figure 3.6.



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SOURCE: U.S. ARMY CORPS OF ENGINEERS

FIGURE 3.3 - GLEN COVE CREEK N.Y. APRIL 1, 1960 DREDGING ACTIVITY

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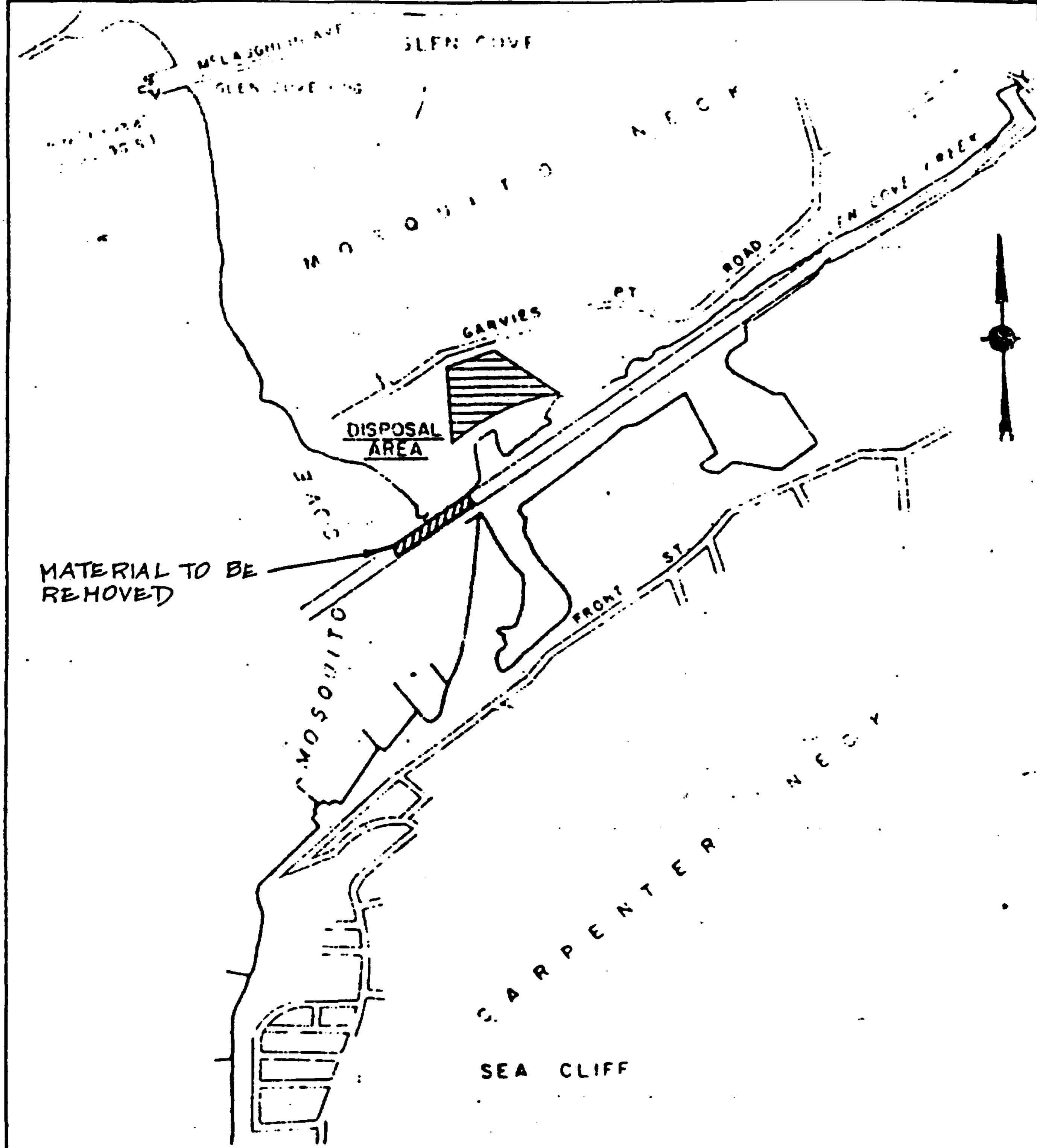

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SOURCE: U.S. ARMY CORPS OF ENGINEERS

FIGURE 3.4 - GLEN COVE CREEK N.Y.- APRIL 1965 DREDGING ACTIVITY

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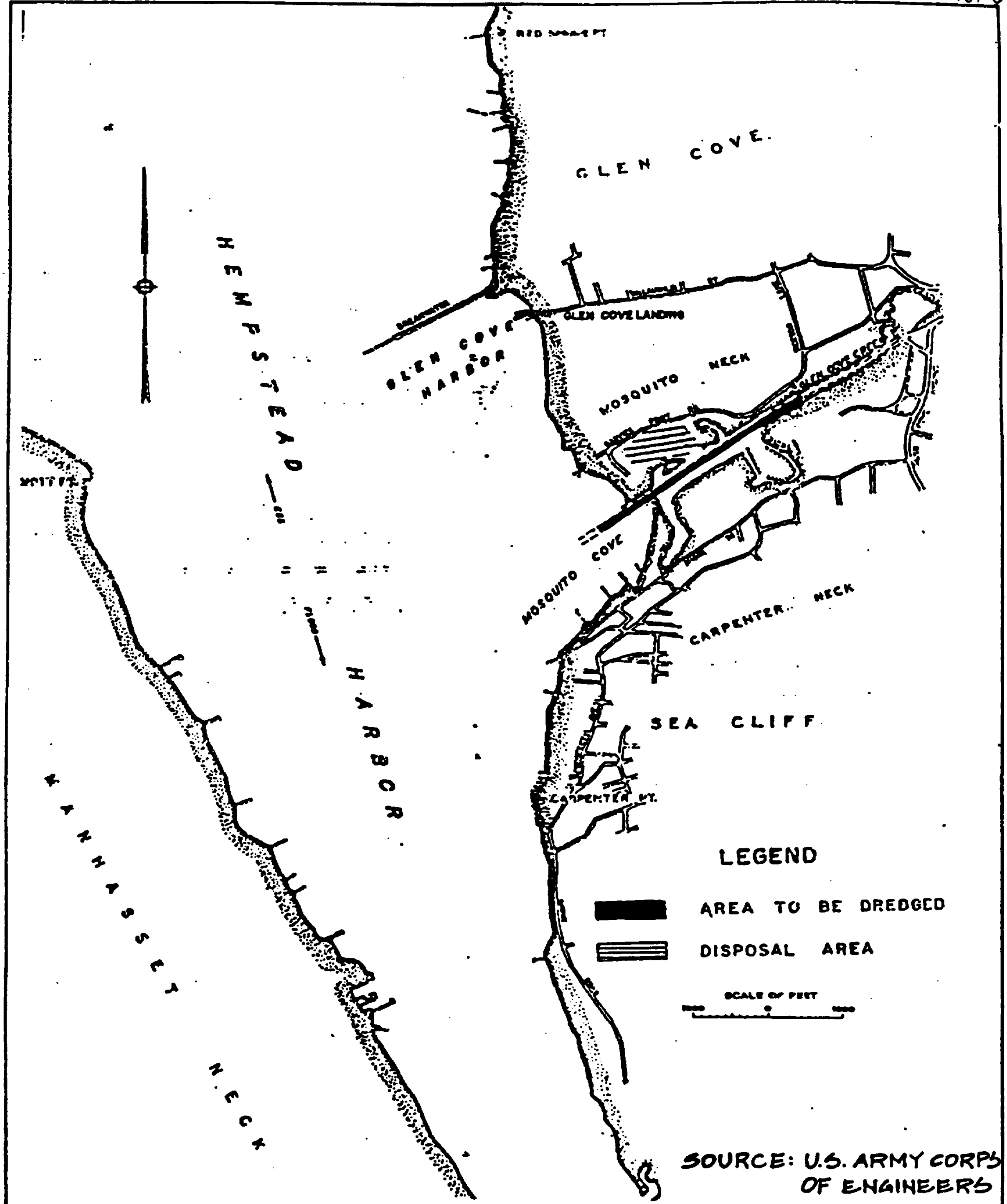

FIGURE 3.5 – GLEN COVE CREEK N.Y.– PROPOSED 1979 DREDGING ACTIVITY NEVER ENACTED

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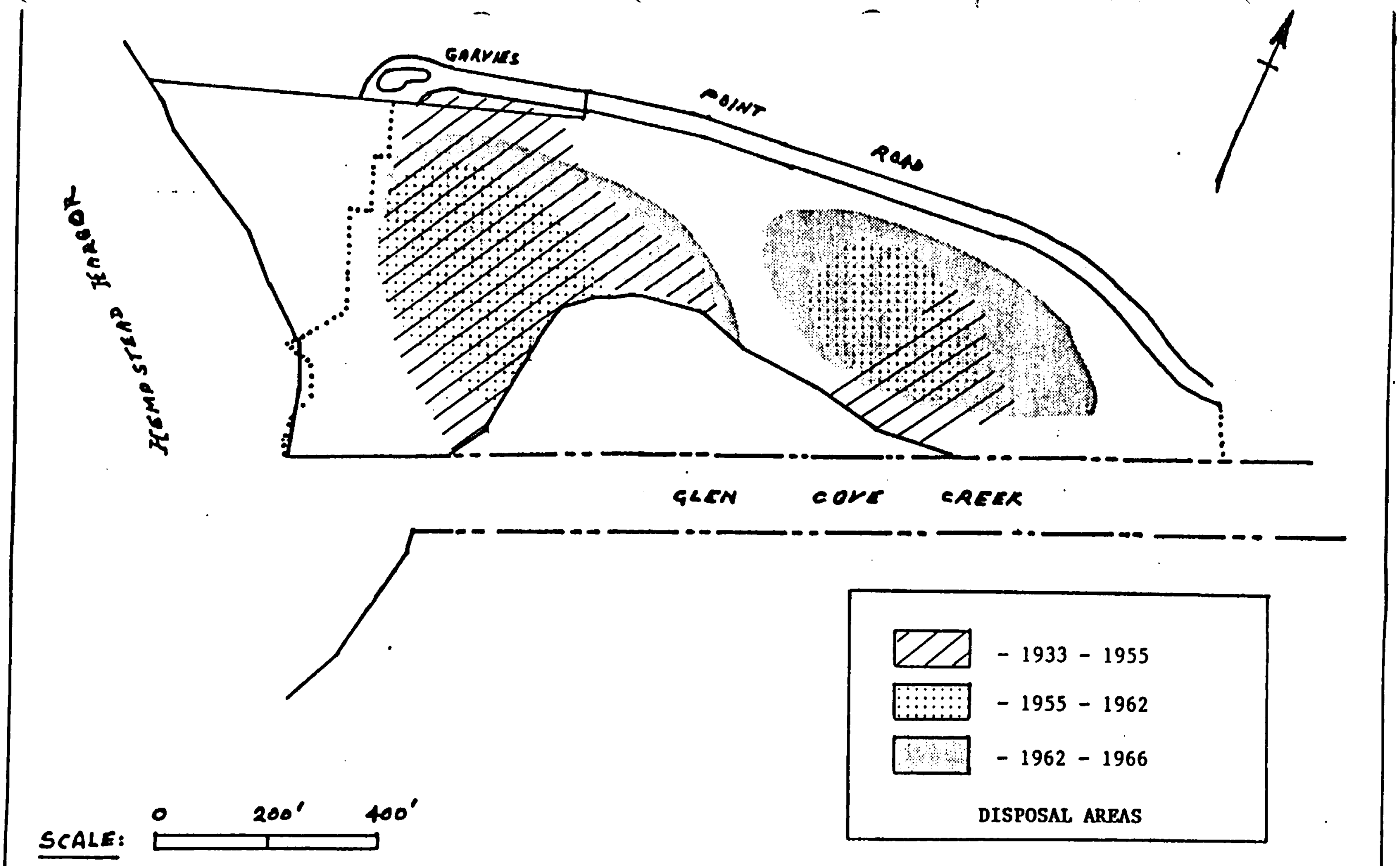

FIGURE 3.6: ON-SITE LANDFILLING ACTIVITY (1933-1966)

3.8 Landfilling Operations

The City of Glen Cove during its ownership of the site, had used it as a landfill. Nassau County Department of Health (NCDOH) indicates that both incinerator residues and wastewater treatment plant sludges were deposited at the site dating back to 1971. The records also indicate that street debris were disposed of at the site.

These findings were also corroborated by Mr. Donald Aitken, a former NCDOH sanitarian who was responsible for periodically inspecting the landfilling activities at the site. Mr. Aitken explained that to his knowledge, household debris was disposed in the western section of the landfill. The primary area of landfilling occurred in the central section of the property involving trenching with a backhoe, filling the trench with garbage and moving to an adjacent area to repeat the process. To his knowledge, the garbage consisted of typical household garbage, construction debris, catch basin clean out material and occasionally sludge from the City sewage treatment plant. The material was not sorted.

Mr. Aitken was unsure of the exact demarcation of the eastern border of the landfill. He did acknowledge that a 20' high sand berm existed along the northern border of the site. This berm was subsequently leveled and graded after 1983. A soil berm also existed along the southern border of the site.

Mr. Aitken did not recall any disposal incidents of industrial or potentially hazardous waste or ash. He also stated, to his knowledge, that the landfill was still active into the early 1980's just prior to the purchase by Village Green Realty. In NCDOH records dating back to 1973, references are made to the disposal of incinerator ash, sewage sludge, household debris and other fill on various portions of the site. Prior to about 1975, the discarded debris in the landfill was burned apparently to reduce the volume and for rodent control. No good records were available where these disposal operations took place, however, based on topography and the aerial photographs, it appears that the center of the current site was the primary disposal area.

3.9 Site Activities After 1983

The various parcels comprising the site were officially purchased by Village Green Realty in the fall of 1983. The ownership of the site prior to 1983 has been outlined in Appendix A.

After the site was purchased by Village Green Realty, Inc., a master plan for development was prepared and approved by various City and County agencies, the NYSDEC, and the Army Corps of Engineers (with respect to the preservation of on site wetlands). The site development plan called for extensive bulkheading along Glen Cove Creek and along the western portions of the site. Many thousands of yards of clean fill were brought onto the site to fill in behind the bulkheading and well as several lower lying areas. As part of the development plan, two retention ponds were developed along the northern border of the property as shown in Figure 3.7. The intended purpose of the retention ponds was to collect surface runoff from the various portions of the site to prevent infiltration of precipitation into the old landfilled areas.

Bulkheading was initially proposed along the entire southern portion of the site. However, because of wetland concerns, approximately a third of the bulkheading was not installed to provide for the protection of the estuarian habitat along Glen Cove Creek.

The initial development plan called for multi-story structures with apartments on the ground floor. Wooden piles were driven into the areas beneath the proposed structures. Because of concerns over methane gas

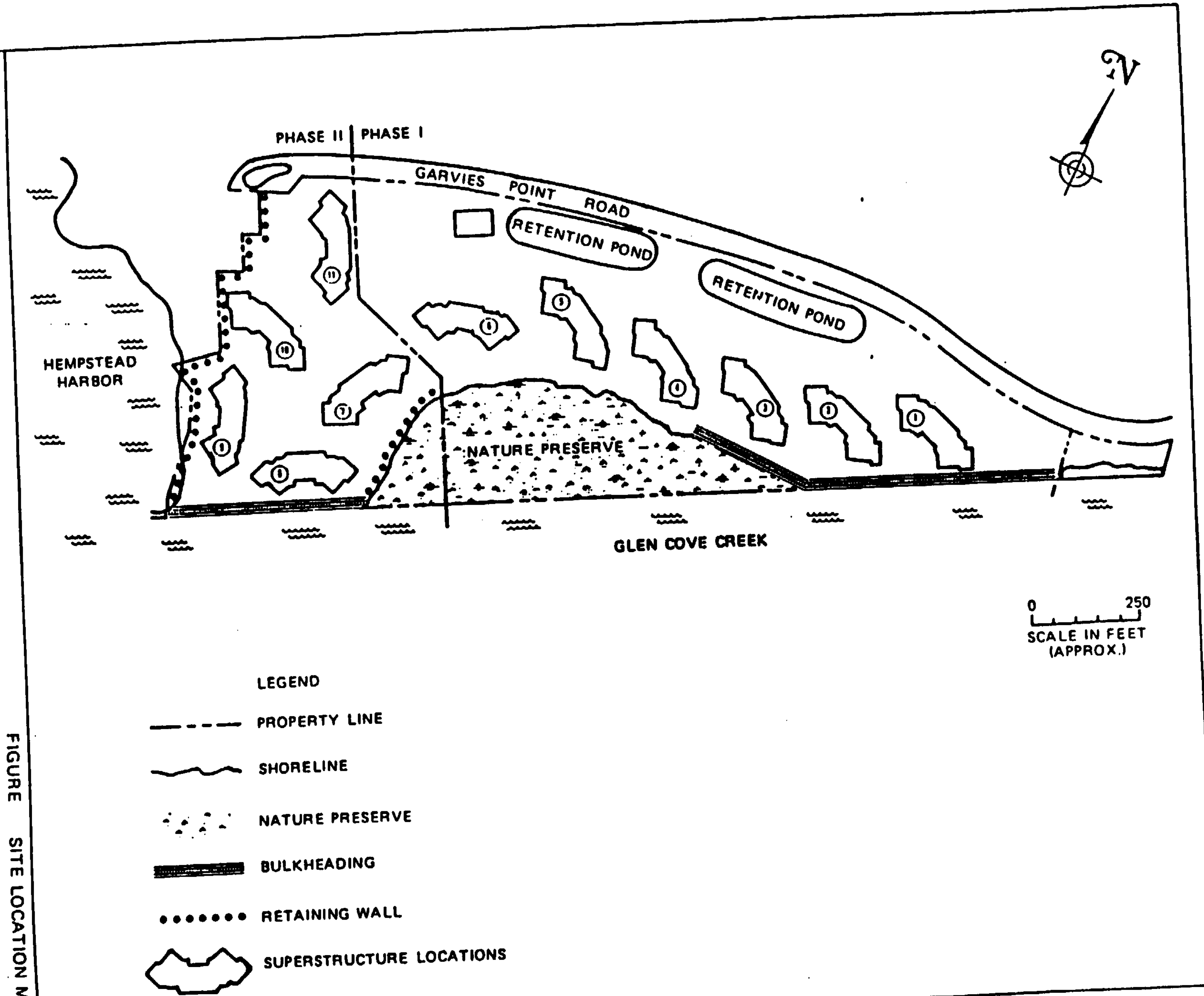

FIGURE SITE LOCATION MAP

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Prepared By RTP Environmental Associates Inc.

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released from the underlying marsh areas, dredge spoils, and the other decomposing landfill materials, a modified plan for condominium development included several special features to prevent the migration of methane into enclosed spaces or into the living units. Additional piles were driven to support the redesigned units bringing the total number of piles driven into the site to approximately 4,000. The site development plan was approved by all regulatory agencies and construction of the superstructures was initiated. Due to financial difficulties and an injunction against the construction, only two superstructures were constructed.

The two super structures were never completed and continue to stand on the eastern portion of the site. Wooden and concrete piles have been placed and continue to remain in over two-thirds of the site. The only section of the site that is free from structures is the western most portion. A sales pavilion was constructed on the western third of the site and a blacktop roadway was constructed to allow access to the sales pavilion. Landscaping was provided along the access roadway as well as surrounding the sales pavilion. To limit access to the site, a six foot high stockade fence and chain link fence was placed along the northern and eastern boundaries of the site.

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APPENDIX A

DATA SUMMARY REPORT

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RTP ENVIRONMENTAL ASSOCIATES INC.

AIR • WATER • SOLID WASTE CONSULTANTS

400 Post Avenue, Westbury, New York 11590

(516)333-4526

March 1, 1988

Mr. Robert Becherer
Regional Engineer
Division of Solid & Hazardous Waste
New York State Department of Environmental Conservation
Building 40
State University of New York
Stony Brook, New York 11794

RE: **Submittal of Data on Garvies Point Condominiums**

Dear Mr. Becherer:

On behalf of Village Green Realty at Garvies Point, Inc., the following data report has been compiled to satisfy the requirements stipulated in the NYSDEC Order On Consent for the referenced site.

The Order requires a brief site history, a description of previous investigations, a historical inventory of aerial photography and other data not previously provided to the NYSDEC. The following report summarizes our findings.

Please review the information and contact me if you have any questions or comments or know of additional information that may be helpful for this site investigation.

Sincerely yours,

RTP ENVIRONMENTAL ASSOCIATES, INC.

Kenneth J. Skipka
Principal

KJS/erl
cc: N. Nyman
D. Rothberg, Esq.
R. Piaggione, Esq. (w/o attach)
K. Phillips, PhD
D. Elias
ID#OCSLSUMMARY3

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DATA SUMMARY REPORT
GARVIES POINT CONDOMINIUM SITE, GLEN COVE, N.Y.

1.0 INTRODUCTION

An Order On Consent exists between Village Green Realty at Garvies Point, Inc. and the State of New York: Department of Environmental Conservation regarding the Garvies Point Condominium Site in Glen Cove, New York (hereinafter known as the site). Village Green Realty is to provide the State with "all data within its possession or control regarding environmental conditions on-site and off-site, to the extent that such data has not heretofore been provided to the Department".

At a minimum, these data shall include:

a. A brief site history,

b. A description of the results of all previous investigations, and

c. A historical inventory and best available copies of all aerial photography available for the site.

This document provides the above data directly, summarizes the studies that have been conducted, and gives the appropriate references for securing the data/information identified above.

2.0 SITE OWNERSHIP HISTORY AND USES

In order to determine former site ownership, a search of the Nassau County property records was performed. The search, in general, determined that the recorded deeds to the property originally dated back to 1899 at which time the site and much of the area surrounding Glen Cove Creek was assigned to Nassau County. In 1909, Wm. H. Seaman acquired ownership. In 1931, the

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City of Glen Cove was deeded the property from the Appleby's. (There is a gap in the records regarding how the Appleby's acquired the property.)

After 1931, many changes in ownership of the property occur. Table 1 lists the owners and when the deed to the property was conveyed. A map of the site is provided as Figure 1.

As shown in Table 1, there has never been an industrial owner of the property except for the CONMAR, Inc. Group. The CONMAR Group purchased the property with an intent of constructing a residuals transfer station on approximately the eastern third of the site. The residuals were to be accepted from surface carriers and transferred to barge transports docked in Glen Cove Creek. Although preliminary plans were developed in 1980, no such facility was ever constructed.

Village Green Realty acquired the several lots that comprise the property during the period 8/15/83 to 10/4/83.

The Nassau County Department of Health (NCDOH) was contacted and their files were reviewed to determine the general uses of the property. Available Nassau County records begin in 1963 at which time the site was being considered by the City of Glen Cove for the landfilling of City incinerator ash and residuals and sewage sludge from the City wastewater treatment plant. Records show that the site was actively used as a disposal site for incineration residuals and for sewage sludge. Nassau County records also indicate that the site was also used by unauthorized individuals for disposal of rubbish. In this case, the majority of the rubbish disposal was apparently confined to household debris. The City of Glen Cove was also accused of illegally using the area to dispose of City street debris. During the early years of City ownership, the records show that complaints had been received by the County. These complaints related to the burning of

TABLE 1

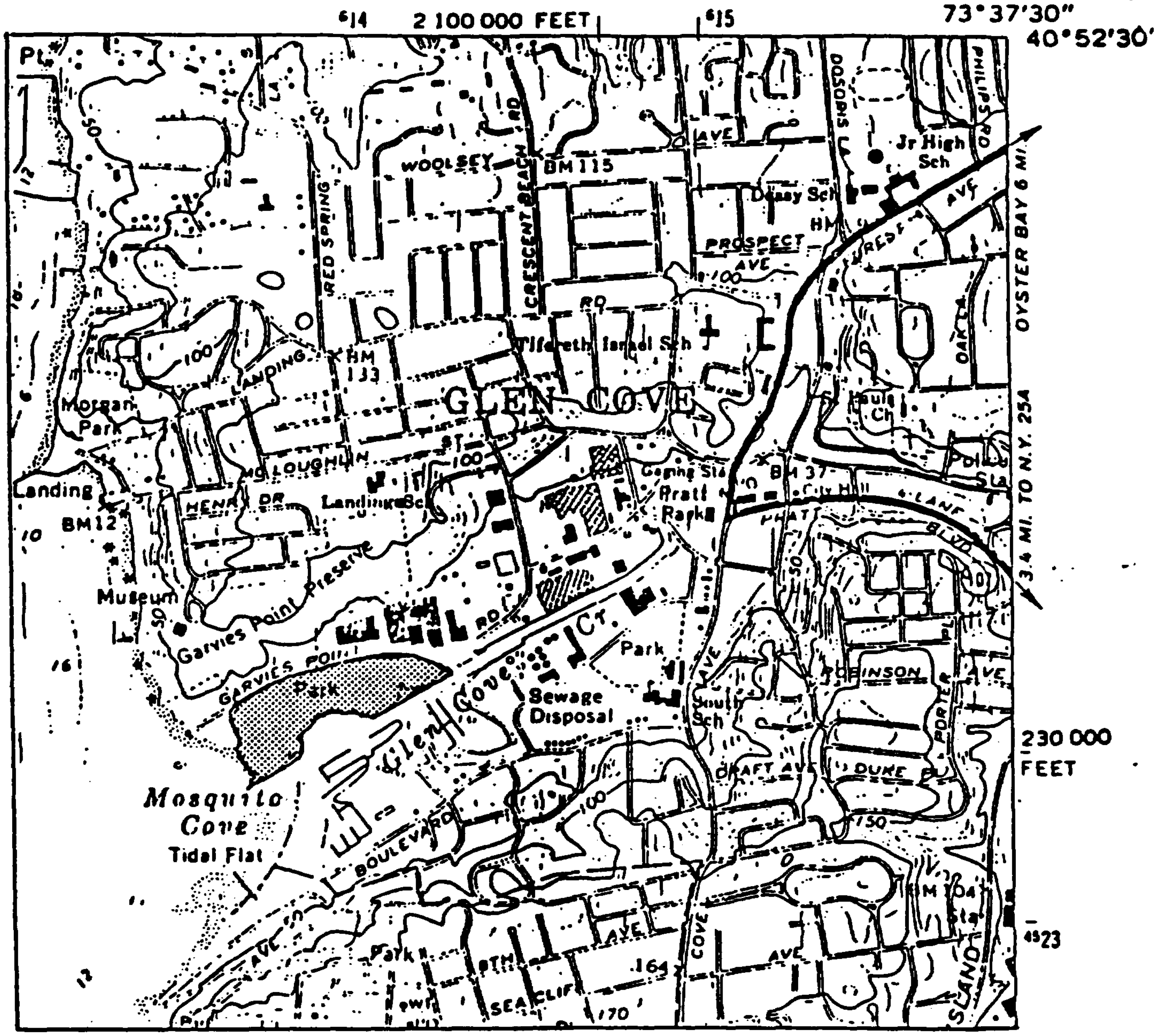
GARVIES POINT SITE OWNERSHIP HISTORY

The site previously consisted of several parcels on Nassau County Tax Maps in Section 21 Block A, Lots 551, 514, 546, 555 and 556. The ownership according to the deeds filed with Nassau County:

Lot #	Owner	Deed Date
26 & 27	Wm. H. Seaman	9/21/09
(later redesignated)		
424 & 546	E.S. Appleby, et. al.	
	City of Glen Cove	6/26/31
	Realty Assoc.	9/13/46
	John White	10/14/47
	Ridgewood Platear	10/4/49
	Realty Assoc.	10/5/49
	Glen Cove Realty Corp.	12/12/51
	J. Graham	01/10/56
	Creek Develop. Corp.	12/20/56
	I.I. Miller	12/22/56
	City of Glen Cove	02/13/58
	Nassau County	04/28/70
	City of Glen Cove	09/13/74
	I.I. Miller	11/19/74
	Lee Langbaum	09/02/76
	CONMAR Blders.	03/26/79
	James O'Connell	12/28/79
	Glen Cove Develop. Corp.	04/16/81
	Village Green	08/15/83
551 & 556	(Similar Listings to above prior to 1977)	
	Glen Cove Urban Renewal	04/12/77
	Glen Cove Community Develop.	04/16/81
	Village Green	10/04/83

SEA CLIFF QUADRANGLE
NEW YORK
7.5 MINUTE SERIES (TOPOGRAPHIC)

6265 I NE
(BAYVILLE)



GARVIES POINT SITE

FIGURE 1: PROJECT SITE AND SURROUNDINGS

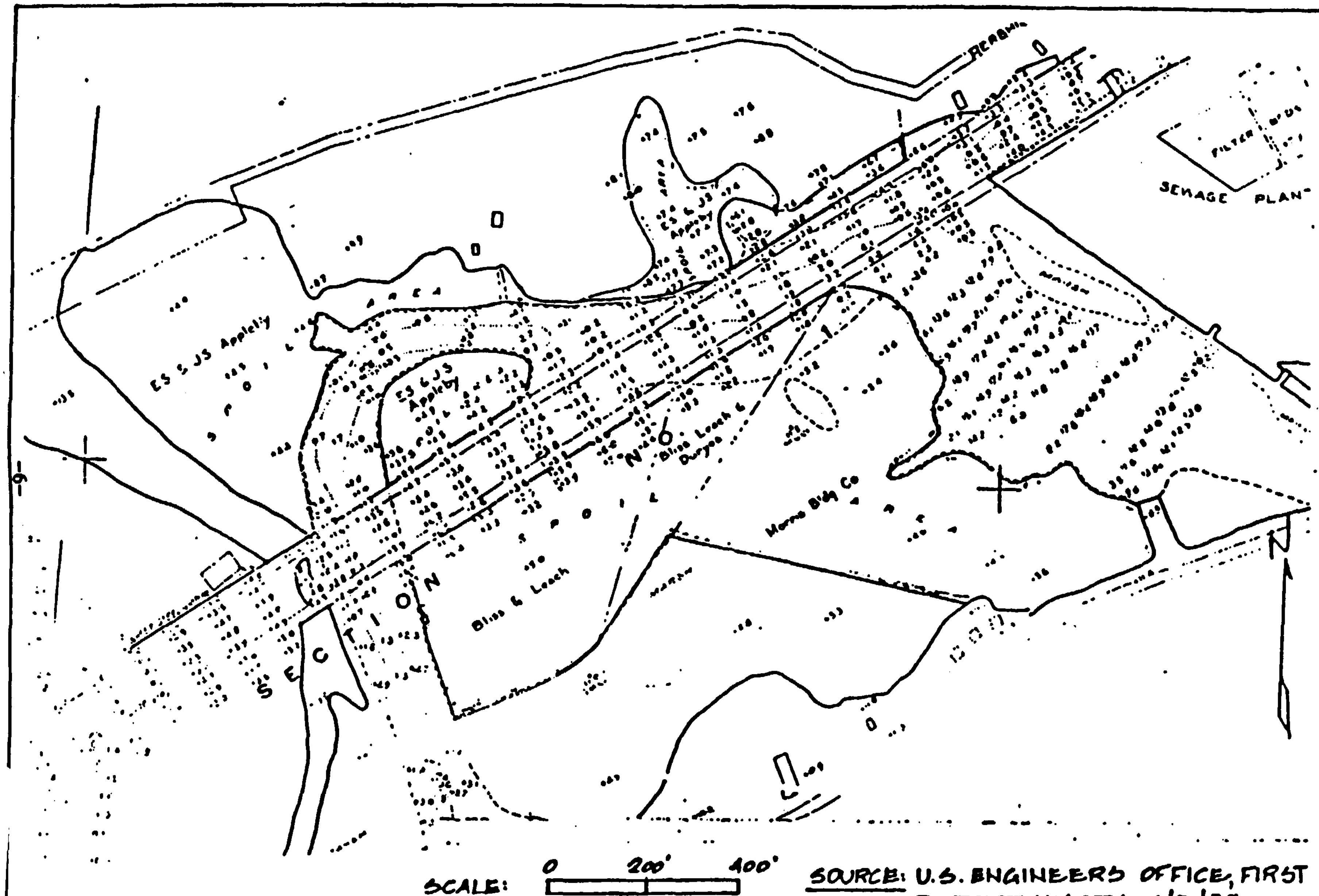
rubbish at the site and to odors allegedly coming from the uncovered sewage sludge. The City of Glen Cove was responsible for the site at this point and the City did clean and remove debris from the site on occasion.

In interviews with NCDOH staff and former staff, attempts were made to secure additional information about the site. Only hearsay information was available about possible illegal industrial dumping on the site. Although such dumping is alleged to have taken place, the types of materials, identification of what was in "drums" observed on site, and physical evidence were not carefully documented (i.e., no labels identifying the contents of drums, no surface staining was recorded and file photographs do not reveal the presence of hazardous waste). Further research into the areas of alleged waste disposal will be performed during the remedial investigation.

The Army Corps of Engineers was contacted to determine if and when dredge spoils were placed on the site. Historic records of the dredging and spoil disposal activities at Glen Cove Creek were reviewed at the Army Corps of Engineers, Navigation Section, New York District Office in New York City. Mr. S. Lew of the Navigation Section provided the files.

An April 1933 map, Figure 2, of Glen Cove Creek from the U.S. Engineers Office, First District New York City shows spoil disposal areas which implies pre-1948 dredging activity. It is obvious that the creek had a major course change prior to 1948, however, where the dredge spoils were placed cannot be determined from the Army Corps files.

Based upon the existing records, dredging of Glen Cove Creek occurred in 1948, 1960 and 1965. A review of the 1948 records determined that the volume of dredge material to be removed as 29,500 cubic yards (estimated). No maps of the actual dredging activity or spoil disposal areas were in the file.



SOURCE: U.S. ENGINEERS OFFICE, FIRST DISTRICT N.Y. CITY 4/3/33

FIGURE 2 GLEN COVE CREEK N.Y.

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A review of the 1960 records estimated the volume of dredge material to be removed as 27,600 cubic yards. The map of the property dated 1957, Figure 3, designates the area of spoil disposal to be in the central section of the property and calculates the area to be 7.8 acres. This designated area is within Section 21, Block A, Lot Number 471 of the City of Glen Cove. Maps of both the area to be dredged and the dredge disposal area from the U.S. Army Corps of Engineers dated 4/1/60 are shown in Figures 4 and 5.

A review of the 1965 records delineates the spoil disposal in the same area and shows the area of material to be removed to be approximately where the Glen Cove Creek discharges into Hempstead harbor.

The proposed 1979 dredging activity did not occur. The upstream area of the creek was not properly bulkheaded for dredging activity. Additionally a sediment sample of the creek obtained by the EPA showed levels of cyanide above regulatory levels. The NYSDEC subsequently declared the proposed dredge spoil as a hazardous waste and prohibited disposal of this material in the landfill. Dredging did not occur because the movement of these materials to other disposal areas was cost prohibitive.

The City of Glen Cove Building Department was contacted to determine if they possessed or had knowledge of data on disposal activities at the site. While being aware of the general nature of disposal activities on the site, the Building Department knew of no data documenting such activities.

3.0 SURROUNDING PROPERTIES

The properties surrounding the site were identified during a site visit. The site is bounded by Garvies Point Road to the north, Hempstead Harbor to the west, the City Anglers Club Marina to the east and Glen Cove Creek to the south (Figure 1). To the north of Garvies Point Road is the Garvies

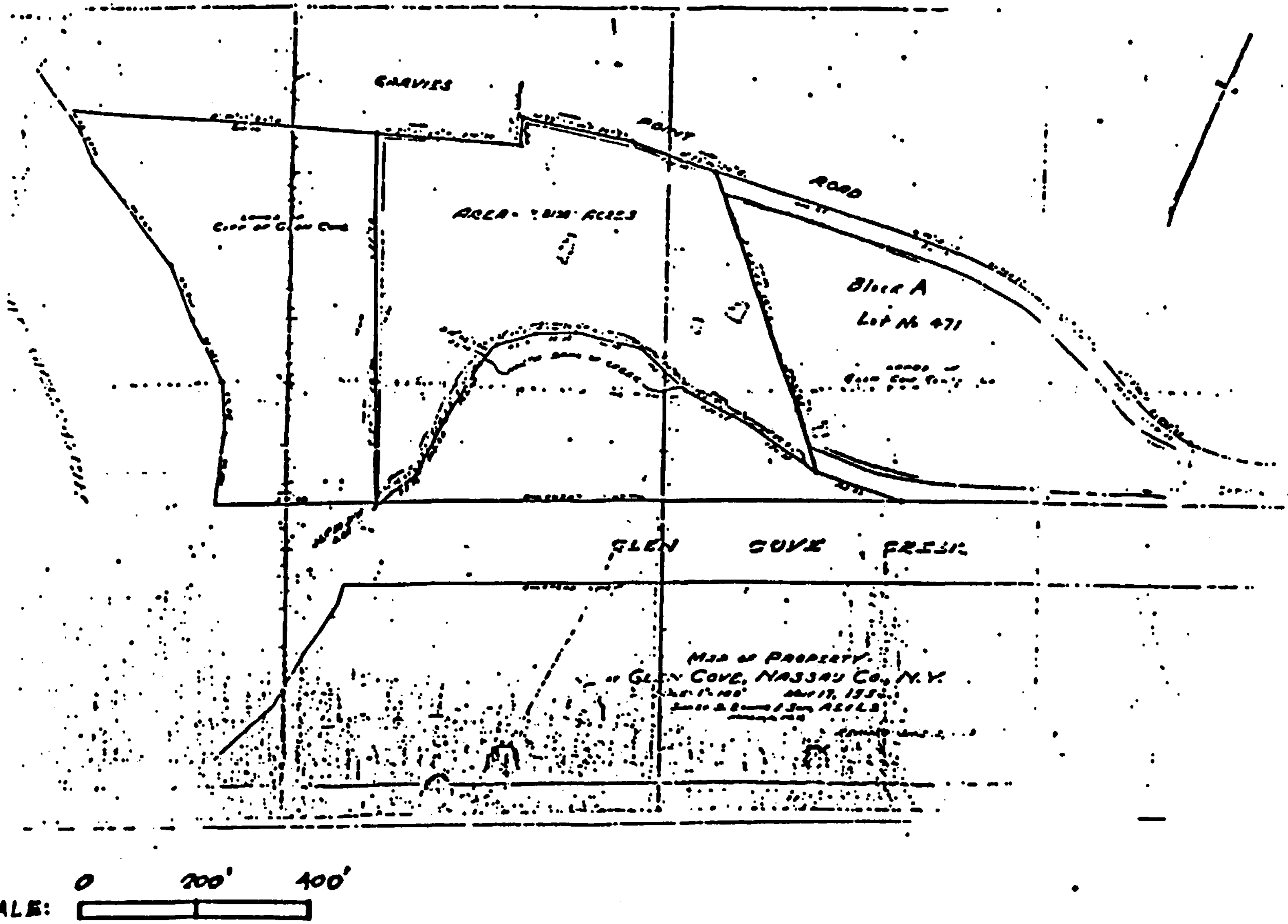

FIGURE 3 SURVEY MAP OF PROPERTY 5/17/57

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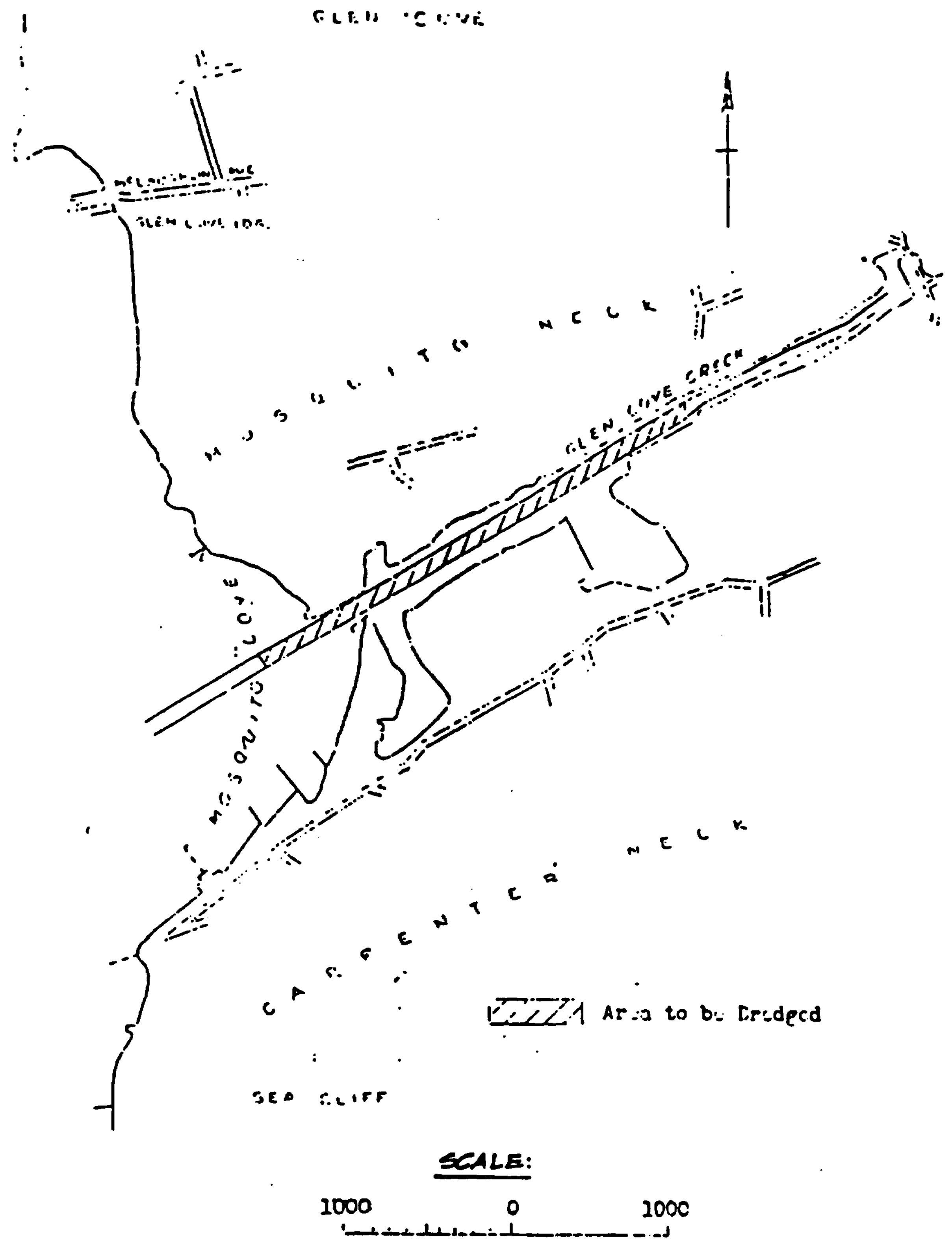
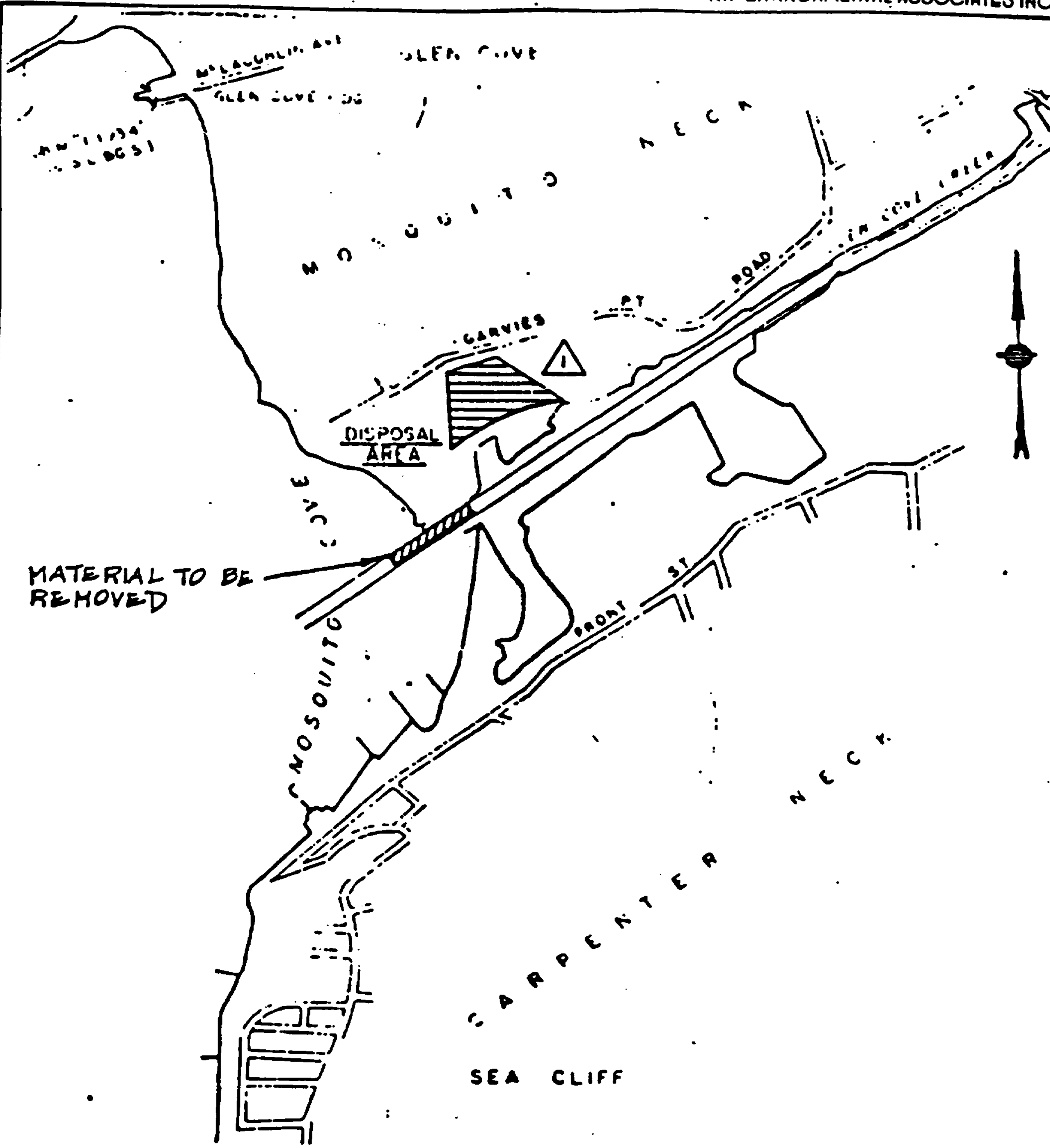
RTP ENVIRONMENTAL ASSOCIATES INC.



SOURCE: U.S. ARMY CORPS OF ENGINEERS

FIGURE 4 GLEN COVE CREEK N.Y. — 1960 AREA TO BE DREDGED



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SOURCE: U.S. ARMY CORPS OF ENGINEERS

FIGURE 5 GLEN COVE CREEK N.Y.-APRIL 1965 PROPOSED DREDGING ACTIVITY

Point Reserve, the Fabric Leather Corporation and the Edmos Corporation. To the west of Hempstead Harbor is the Port Washington Peninsula. To the south of Glen Cove Creek are several marinas and the City codisposal plant. To the east of the City marina is Cove Oil Company.

A search of the registered water well records at NYSDEC Region I was conducted. Wells within a one mile radius have been identified and are summarized in Table 2. The nearest water supply well on record is located at the Fabric Leather Corporation and is rated to draw 380 gallons per minute.

4.0 PREVIOUS ENVIRONMENTAL AND OTHER SITE INVESTIGATIONS

The previous site investigations are listed below in reverse chronological order. This constitutes the information available to Village Green.

Date	Description
March 1986	RTP Environmental Associates and H_2M conduct a water test of CDM Well #2.
Nov-1985/Feb 1986	CDM conducts a preliminary site investigation to determine if hazardous materials are present in the air, water or soils (CDM, 1986)
1985	LKB conducts a soil boring and monitoring well program to determine subsurface soil stratigraphy, hydrogeology and soil classification. Gas monitoring wells were installed to determine subsurface methane levels.

5.0 AERIAL PHOTOGRAPHIC INFORMATION

Three sources of aerial photographs were investigated. These included Lockwood Kessler and Bartlett (LKB), Syosset, New York; Aeroservice, Inc., Houston, Texas; and Aerographics, Inc., Bohemia, New York. Of the three

TABLE 2

PUBLIC AND PRIVATE SUPPLY WELLS WITHIN A ONE MILE RADIUS OF THE GARVIES POINT SITE

NYS DEC #	OWNER OR WELL FIELD	CAPACITY G.P.M.	DEPTH (ft)	WATER USE
1917	Wah Chang Trading Corp.	250	307	Processing
2847	Skouras Thearte Corp.	425	116	Cooling
3466	New York Water Service Corp.	208	177	Public Supply
3993	Henry's	20	70	General
4432	Dykman Laundry	90	352	Laundry
4440	Limco Manf. Corp.	200	316	General
5686	City of Glen Cove	45	92.5	Process Water
6416	Zara Asphalt Co.	37	106.5	-
6549-D	Columbia Carbon & Ribbon	225	425	Diffuser
6587	Zara Asphalt Co.	103	56	-
6594	City of Glen Cove	65	51	Air Conditioning
7588	Hempstead Harbor Yacht Club	-	26	No Water
7614	Powers Chemco Corp.	-	393	Diffuser
7857	Sea Cliff Water Co.	1300	614	Municipal Supply
8048-D	Powers Chemco, Inc.	-	370	Diffuser
8326	City of Glen Cove - City Hall	1400	168	Municipal
8327	City of Glen Cove - City Hall	1753	168	Municipal
8453	Powers Chemco	-	125	Test Well
8690	Fabric Leather Corp.	-	347	Cooling
8709	Fabric Leather Corp.	380	312	-
8887	Slater Electric, Inc.	240	130	Cooling
9612	Slater Electric, Inc.	-	109	Cooling
9841	Slater Electric, Inc.	240	121	Process Cooling

groups, LKB had the most complete set of aerial coverage of the site dating from April 5, 1950 thru March 21, 1986. Stereographic pairs are available for the following dates: 4/50, 1/55, 3/62, 566, 4/69, 4/72, 4/78, 3/84 and 3/86. The 1950 and 1955 photos are at 1"=1000' scale while the remaining years to 1984 are at 1"=1600'. The 1986 photos are at a 1"=800' scale.

Original copies of the photographs are available at Lockwood, Kessler & Bartlett, One Aerial Way, Syosset, New York 11791.

Xerox copies of the site photos for each year are attached for convenient reference.

The other sources of aerial photographs only have very limited coverages of the site. These were not investigated further because the LKB footage was considered more than sufficient to cover the period and area of interest.

6.0 OTHER SITE INFORMATION

The NYSDEC files already contain the other data that the applicant has been able to gather on the site with respect to the information request in the Order On Consent. The applicant will continue to search for additional pertinent information on the site relating to the referenced Order. These materials will also be provided to the NYSDEC according to the requirements established in the Order.

REFERENCE 4

PRELIMINARY RADIOLOGICAL ASSESSMENT
OF THE
LI TUNGSTEN FACILITY, GLEN COVE, NY

December, 1989

the Organization, inc.

post office box 791 ■ peekskill, new york 10566 ■ (914) 737-7200

103496

PRELIMINARY RADIOLOGICAL ASSESSMENT

OF THE

LI TUNGSTEN FACILITY, GLEN COVE, NY

Prepared for:

Glen Cove Development Corp.
34 Market Place
Baltimore, Maryland 21202

Prepared by:

The NDL Organization, Inc.
PO Box 791
Peekskill, NY 10566

December, 1989

EXECUTIVE SUMMARY

The tungsten refining process at Li Tungsten utilized ores containing low levels of natural thorium and uranium at concentrations averaging 10 to 20 pCi/g. About 2000 cubic yards of unprocessed and semi-processed ore are stored in and around the main factory on parcel A in thousands of decaying drums and crates. Ambient gamma fields near this material ranges from 10 to 30 uR/hr with levels in the 50-500 uR/hr range at 1 cm. Radon, thoron, and airborne long-lived alpha levels measured in the main (Dice) Building are within acceptable levels. The unprocessed and semi-processed ores thus do not present a significant radiological hazard.

After tungsten is removed from these ores, the radionuclides become more concentrated in the waste products which take the form of hard, concrete-like rocks, or slag, and various type of granular material. Radionuclide levels in the waste products approach 1000 pC/g and thus pose an internal radiation hazard if dusts become airborne, and an external radiation hazard by emission of beta-gamma radiation at levels in the 1 to 10 mR/hr range. There are about 500 to 1000 cubic yards of these higher level waste products piled on the ground on all 3 parcels. About 10,000 cubic yards of lower radioactivity soils and other waste materials are also piled on parcels B and C. The presence of any higher activity materials buried at greater depths under these piles is presently unknown. No significant radionuclide migration from the site via surface water run-off was detected.

A small amount of thorium metal processing also was performed at Li Tungsten. About 200 lbs of thorium metal (reading 65 mR/hr), several pails of what may be monazite or zircon sand, and 3 small furnaces with gamma levels in the 10-20 mR/hr range were found. These thorium process materials pose a greater radiological hazard than do the tungsten process materials. Fortunately, there is a small quantity of thorium materials which can be easily packaged and disposed. As of December 11, 1989, 113 cu.ft. of these highly contaminated materials and equipment have been removed from the site. Areas of thorium contamination remaining at the site include: a 1000 sq.ft. asphalted area in parcel A contaminated to 4500 dpm alpha/100 sq. cm.; a 2000 sq.ft. heavily vegetated area in parcel C with soil contaminated to about 1000 pCi/g; and a brick-lined pit behind the laboratory where thorium solutions were known to have been stored.

This survey identifies 9 specific areas of concern: 7 completely within the controlled area and 2 near the perimeter fence affecting both the controlled and uncontrolled areas. Five of these areas have been remediated in December, 1989. The data presented in this report shows pre-remediation radiation levels, however, when remediated areas are discussed, they are marked with "remediated". The 4 remaining areas include: the heavily vegetated area on parcel C discussed in the preceeding paragraph (~3-5 mR/hr), a pile of 6-12" slag rocks on the northern end of parcel C (~1-3 mR/hr), a pile of large (3 ft diameter) slag rocks along the northern fence of parcel A (~1-3 mR/hr) causing 160 uR/hr through the fence, and buried waste under the north fence of parcel A causing 300 uR/hr near the ground surface on the uncontrolled side of the fence. Remediation of these areas will require excavation with heavy equipment.

In general, the building structural components and factory equipment are not significantly contaminated. Most horizontal surfaces have an easily removable layer of ore dust. However, radiation measurements from many vats and tanks, indicate that their internal surfaces may have been contaminated with radionuclides during the various heating and chemical processing stages of tungsten refining. Closer investigation of the tank and vat interiors should be performed after their contents are characterized and removed.

Standard contamination control procedures outlined in the site safety manual will adequately protect chemical and radiological remediation teams from internal radiation exposure at the site. The remaining sources of significant external radiation (>2 mR/hr) have been roped-off.

Potential for exposure of the public is very low. The 2 areas of concern at the northern fence of the main parcel along Herb Hill Road have elevated radiation levels (0.1-0.3 mR/hr) on the grassy area between the road and the fence. Radiation levels from these sources drop off to background within 4-6 feet of the fence and pose no hazard for persons on foot or in vehicles on Herb Hill Road.

Table of Contents

1.0 INTRODUCTION

The Li Tungsten facility consists of 26 acres on which exist buildings (over 300,000 sq.ft. of floor area), forested areas, ponds and swampy areas. The site was operated from the 1940's to the 1980's as a tungsten refining and processing facility and is now abandoned.

Tungsten ore, or schelite, was obtained by Li Tungsten from mines in Canada and China. In addition to tungsten, schelite contains the naturally-occurring, thorium and uranium series of radionuclides. These radionuclides are concentrated by the tungsten refining process so that the intermediate and waste products may pose a radiation hazard.

Schematics of the Thorium-232 and Uranium-238 decay series are shown in Figures 1.1 and 1.2. The Uranium-235, or Actinium, series is also present with the U-238 series, but at much lower levels. Radionuclides from these 3 series emit alpha, beta, and gamma radiation and thus pose both external and internal radiation hazards when found in high concentrations.

Approximately 12,000 cu.yards of ores and slags have been found on site. Most of this material occurs in piles on the two forested parcels of land. However, about 2000 cu.yards of material is contained in thousands of decaying drums and crates located in the main plant building.

Thorium occurs naturally in soil at a background level of about 1 pCi/g, or about 9 ppm (ref: NCRP 45). Uranium-238 and its progeny, including Radium-226, occur naturally in soil at a concentration of 0.6 pCi/g (ref: NCRP 45). Thorium concentrations in the various ore samples from the site range from background to 10's of pCi/g. Concentrations in slag, sludge, and other waste products range from 100's to 1000's of pCi/g. For comparison, the limit for unrestricted use, or "clean", soil in New York State Code Rule 38, Table 5 is 500 ppm source material, or 55 pCi/g Thorium or 180 pCi/g Uranium. The limit for radium in soil affected by uranium mines and mills is 5 pCi/g from the surface to 15 cm deep and 15 pCi/g below 15 cm (ref: EPA, 40CFR192 Uranium Mill Tailings Control Act).

Pure thorium is used in metal alloys, as optical coatings on camera lens, in vacuum tubes, and in arc lamps. It historically has been thought of as a bulk, low radioactivity material. "Source material" is a general term referring to thorium or uranium as metal, ore or bulk material. Any industrial or educational institution may possess up to 15 lbs of source material under a general license without regard to specific licensing or regulatory authority except disposal (Ref: NYS Code Rule 38 and NYS Sanitary Code Part 16). Also, possession of ores or products containing less than 500 parts per million (ppm) source material are exempt from licensing (NYS Code Rule 38).

The predecessor company to Li Tungsten, Wah Chang Trading Company, had a NYS Dept. of Labor radioactive materials license to work with pure thorium and high level thorium ores. About 10 pails and drums of material having thorium series concentrations in the 10,000 pCi/g range have been found. One drum contained about 200 lbs of thorium metal. These are likely remnants of the thorium work which should have been discontinued when the license was terminated in the early 1970's.

2.0 OBJECTIVES

The objectives of this survey are to:

1. assess the types, quantities, and concentrations of radionuclides present at the site;

2. identify radiological hazards that may be encountered by chemical and radiological remediation teams; and

3. identify radiological hazards that may cause exposure to the general public.

4. identify for subsequent removal and disposal up to 15 drums material exhibiting elevated radiation levels over 1 mR/hr.

The present project is intended to be an initial screening survey utilizing survey instruments and approximately 150 soil/process material samples.

3.0 MEASUREMENTS PERFORMED

A map of the site was overlaid with a 25'x25' grid. Gamma radiation exposure levels were measured using a NaI probe, or microR meter, at site locations within each section of the grid. Exposure rates from many radiation sources were investigated and recorded along with ambient exposure rates. A Geiger-Mueller probe in a large area configuration (pancake probe) was also used to investigate the many types of sources found. This probe is sensitive to alpha, beta, and gamma radiation and is more directional then the microR meter. The pancake probe is useful to measure specific sources in the presence of other interfering sources.

4.0 RESULTS

4.1 EXTERNAL RADIATION SURVEY

Readings from the microR and GM pancake meters are shown in Appendix A. The microR data is plotted on maps of the plant in Figures 4.1 through 4.4 as a graphical representation using cross hatching of grid sections in which elevated gamma radiation levels were detected.

4.2 WIPE TESTS

The results of wipe samples are shown in Appendix C. Only 2 of the 274 wipes showed significant removable activity.

4.3 AIR SAMPLES

Results of 4 air samples for long-lived alpha activity collected in the Dice Building are shown below:

Table 4.2 - Airborne Alpha Radioactivity Measurements

Sample#	Date	Location	Gross Alpha Conc.
RAD/A-1	6/27/89	Dice Bldg near ore pile	$< 1.7\times10^{-13}$ uCi/ml
RAD/A-2	6/27/89	Dice Bldg near roto kiln	$< 1.8\times10^{-13}$ uCi/ml
RAD/A-3	6/30/89	Dice Bldg in mixing room	$< 3.8\times10^{-13}$ uCi/ml
RAD/A-4	6/30/89	Dice Bldg in mixing room	$< 2.8\times10^{-13}$ uCi/ml

NYS Code Rule 38 limit

Public:	2×10^{-12} uCi/ml Th-nat
Occupational:	6×10^{-11} uCi/ml Th-nat

Radon-222 and Radon-220 (Thoron) results obtained by the Dept. of Energy are shown in Table 4.3.

4.4 SOIL/PROCESS MATERIAL SAMPLING

The locations of sample collection are shown in Appendix B. The results of the samples analysis are shown in Table 4.1.

An alpha scintillation detector was also used to measure fixed alpha contamination. However, these measurements were of limited use because the source of alpha radiation, the ore, caused self-attenuation of the alpha particles, thus preventing efficient detection. Significant fixed alpha activity was found only in a few areas.

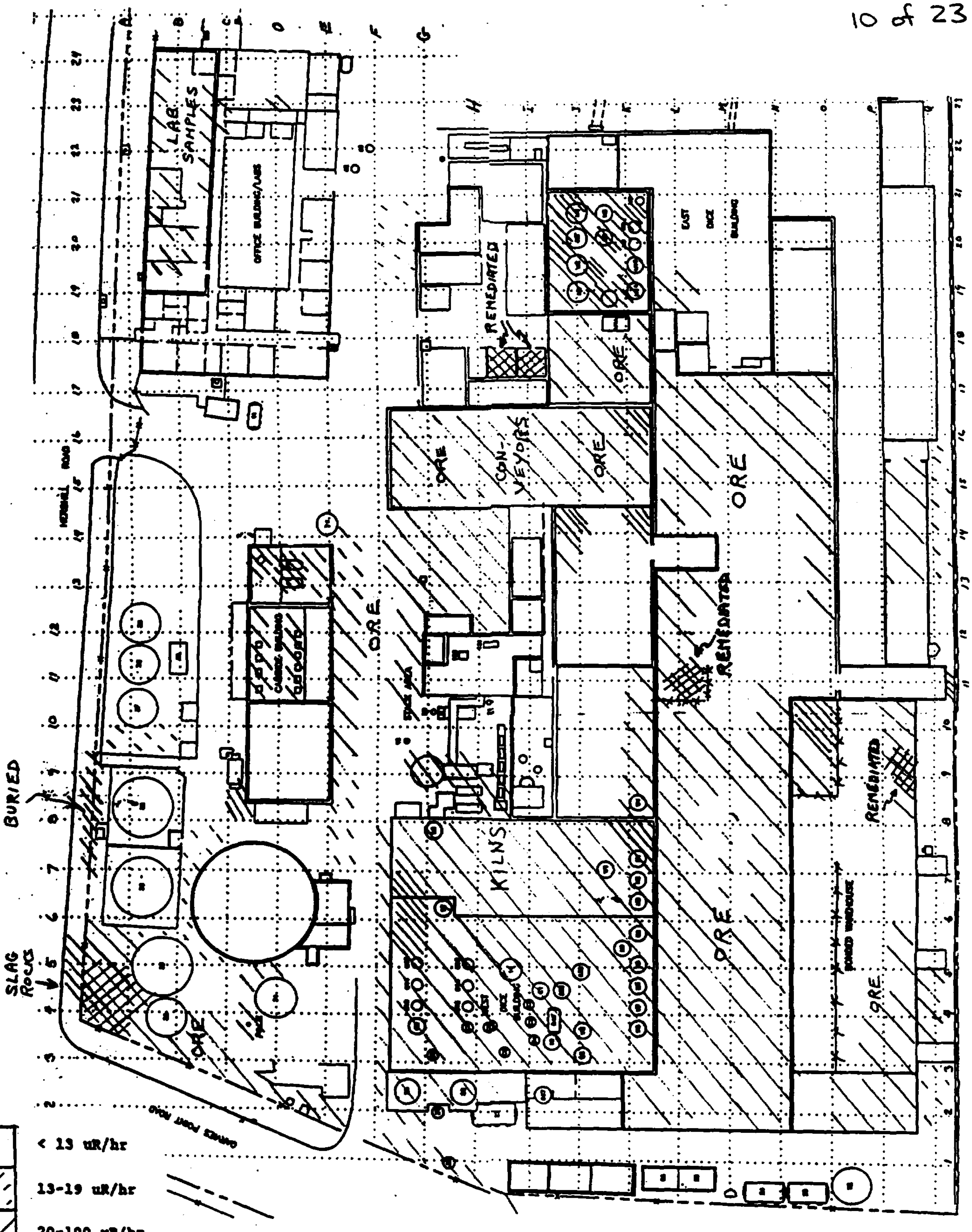
Wipe tests were performed on floors and equipment in the Offices, Laboratory, Wire Plant, and Dice Building to assess removable alpha and beta contamination. They also proved to be of limited usefulness because most of the contamination occurred in the form of low specific activity, ore dust which is not collected by wipes in sufficient quantities to be detected.

Radionuclide concentrations in solid material were investigated by the collection of 152 samples. They included samples of ores, slag, intermediate materials, pond/swamp sediment, and soil. Soil samples were collected both within the plant boundaries and around the perimeter. Normally, 3 samples were collected from each soil sampling location: surface, 6-12", and 12-24" deep. In this way, data concerning radionuclide leaching, migration or burial could be obtained.

The soil and process material samples were analyzed with a gamma spectroscopy system using a high purity germanium detector. Gamma rays from Ac-228 were used to determine the Th-232 concentration, that of Th-234 and Pa-234m were used to determine U-238, and that of Pb-214 and Bi-214 were to determine Ra-226. Gamma rays from other nuclides in the decay chains were analyzed but the results are not listed in this report unless unusual chain equilibria were found. These analyses are useful not only to compare radionuclide concentrations with regulatory guidelines, but also to gain information on the types of processes and materials that were used at Li Tungsten.

Several air samples were collected and analyzed for long lived alpha emitters. The Dept. of Energy's Environmental Measurements Laboratory also conducted thoron (radon-220) measurements in the main plant building. The purpose of air sampling and analyses was to assist in establishing appropriate levels of protection for on-site workers during implementation of remedial actions at the site.

The survey was performed during the period June to September, 1989.



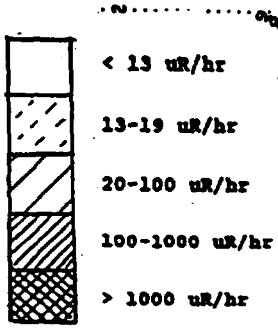


Figure 4.1 - Gamma Radiation Level Diagram

Parcel A: Office, Dice, & Carbide Bldgs.

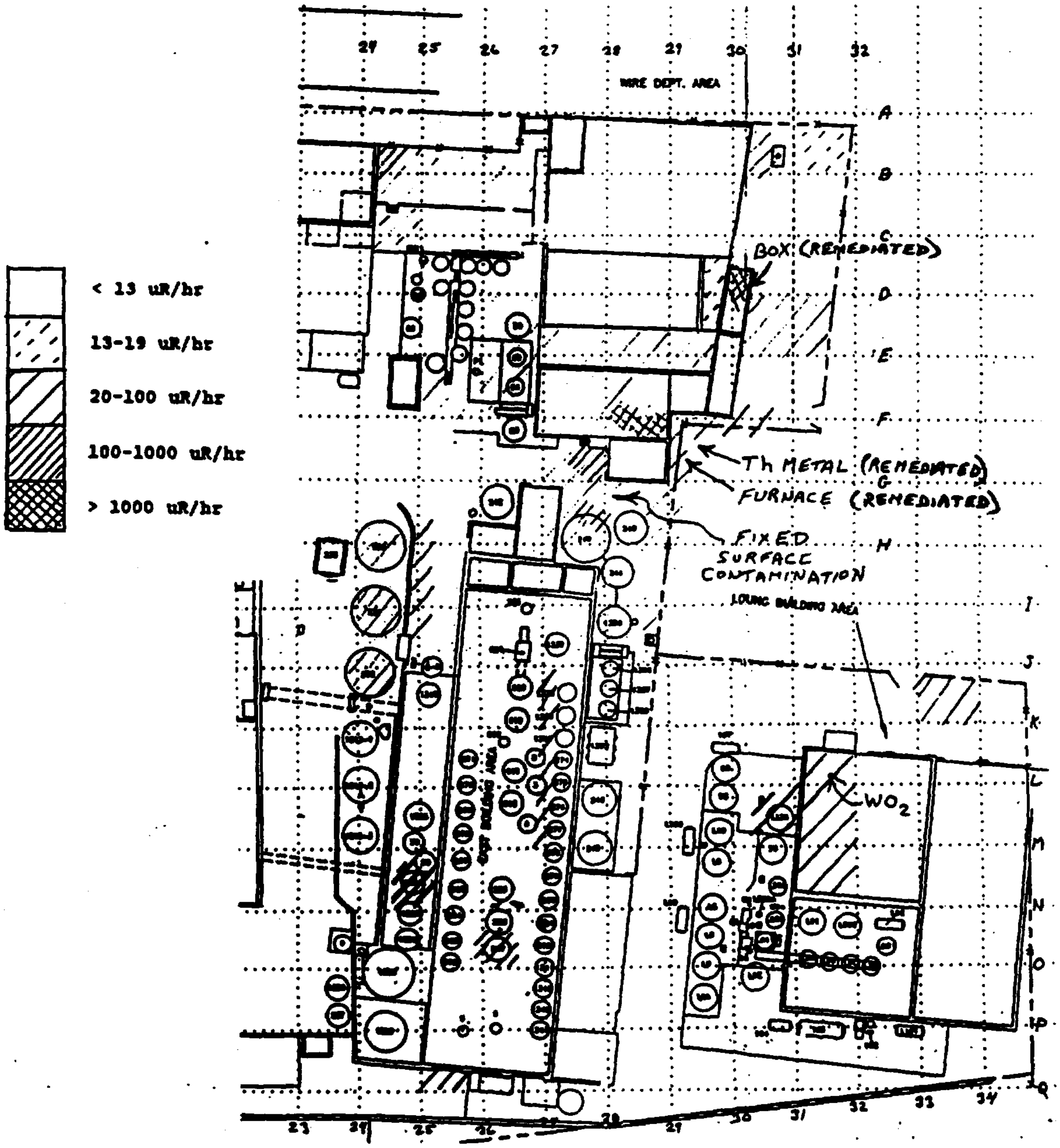


Figure 4.2 - Gamma Radiation Level Diagram
Parcel A: Wire Plant, East Bldg, & Loung Area

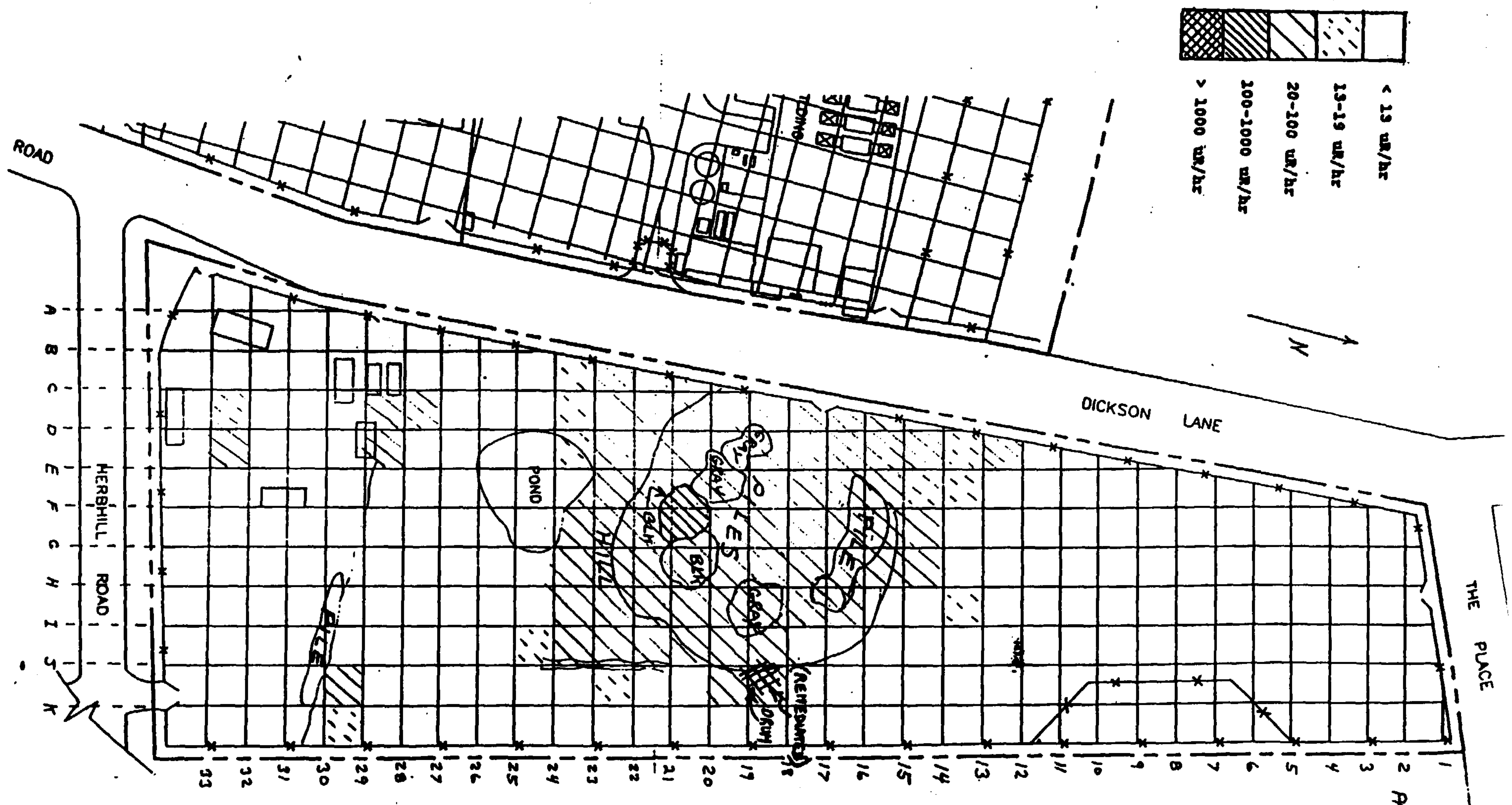


Figure 4.3 - Gamma Radiation Level Diagram

Parcel B

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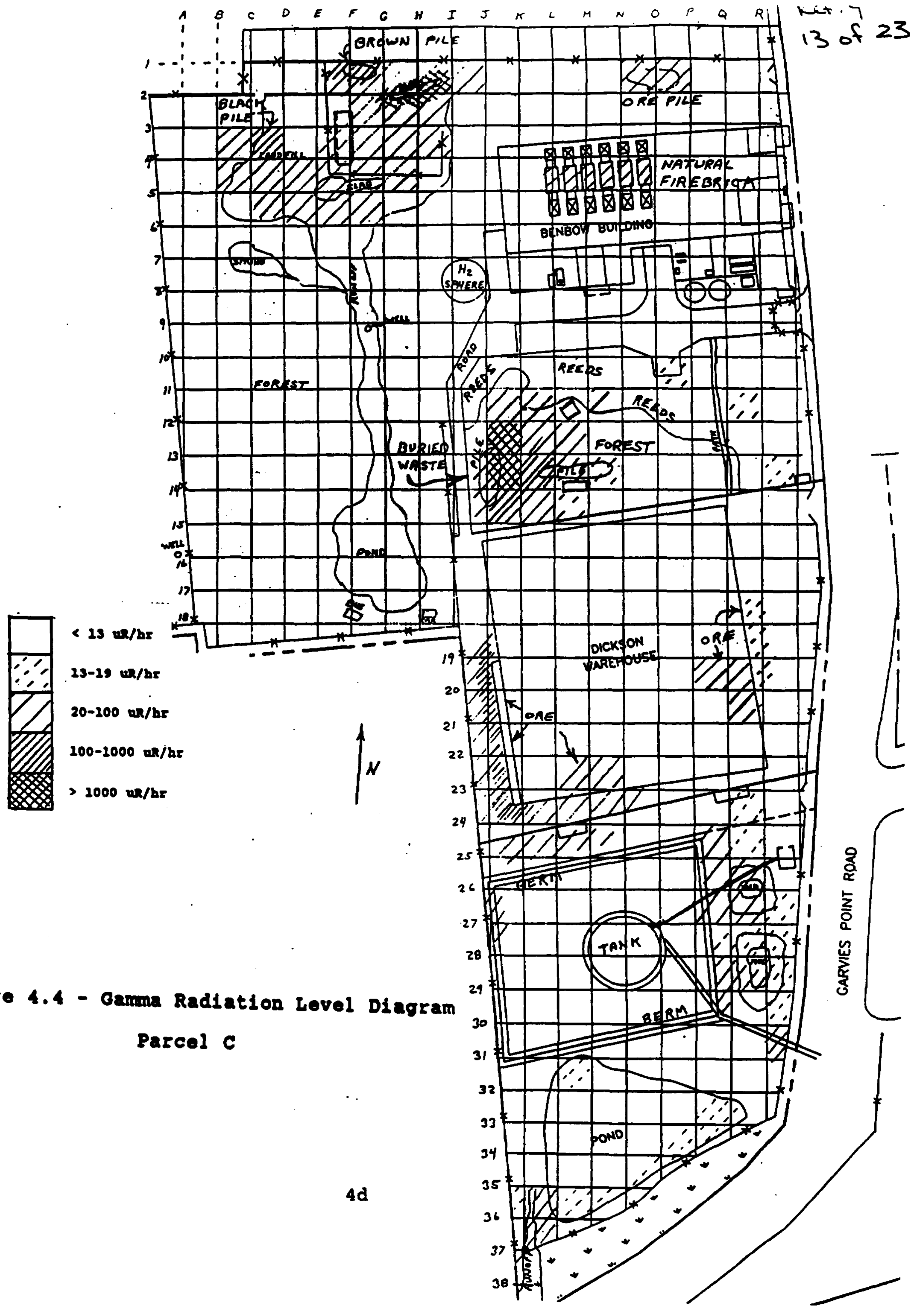

Figure 4.4 - Gamma Radiation Level Diagram

Parcel C

Table 4.1

LI TUNGSTEN SOIL / PROCESS MATERIAL ANALYSIS

SAMPLE #	WT (g)	PAR-CEL	GRID #	TH-232+ DAUGHTERS (pCi/g)	U-238 + DAUGHTERS (pCi/g)	RA-226 (pCi/g)	CPM READING	uR/hr	SAMPLE DESCRIPTION
P1	105.9	B	D25	1.3 +- 0.4	<1.5 +- 0.0	0.6 +- 0.2	60	10	POND SEDIMENT W SIDE OF POND
P2	108.0	B	G26	1.0 +- 0.4	<2.1 +- 0.0	0.6 +- 0.1	60	28	POND SEDIMENT - E SIDE OF POND
P3	74.7	C	L35	2.5 +- 0.5	<3.0 +- 0.0	1.1 +- 0.2	60	10	POND SEDIMENT - SW SIDE OF POND NEAR OIL TANK
P4	106.0	C	N34	5.2 +- 1.8	19.6 +- 3.7	6.4 +- 0.5	60	14	POND SEDIMENT - E SIDE OF POND NEAR OIL TANK
P5	143.5	C	F17	1.6 +- 0.3	<1.7 +- 0.0	1.0 +- 0.1	60	10	POND SEDIMENT - E OF DICKSON, RUNOFF FROM LANDFILL
1	145.0	A	A5	7.9 +- 0.0	15.6 +- 0.0	2.5 +- 0.3	200	22	BLACK ORE SPILLED - NW CORNER
2	121.0	A	B3	2.6 +- 0.4	<3.3 +- 0.0	2.4 +- 0.2	100	22	BROWN ORE - NW CORNER
3	136.5	A	B4	6.8 +- 2.0	54.0 +- 5.6	64.0 +- 1.0	1000	900	BLACK ORE - NW CORNER
4	126.0	A	C3	4.7 +- 0.0	5.2 +- 0.0	3.2 +- 0.3	100	20	GRAY ORE - NW CORNER
5	110.0	A	F3	9.5 +- 0.0	<9.8 +- 0.0	<2.3 +- 0.0	100	30	LT. BROWN POWDER - NEAR WEST DICE
6	122.0	A	G4	9.1 +- 0.0	96.0 +- 0.0	42.1 +- 0.9	600	25	DK. BROWN GRANULAR - NEAR WEST DICE
7	132.5	A	G5	9.5 +- 1.6	<22.7 +- 0.0	29.9 +- 0.8	600	20	GRAY BROWN POWDER - NEAR WEST DICE
8	167.0	A	A4	175.0 +- 2.0	<90.0 +- 0.0	59.9 +- 1.1	4000	1400	LARGE SLAG BOULDER - NW CORNER
9	146.0	A	F9	12.8 +- 0.9	8.5 +- 2.8	8.7 +- 0.4	300	60	DK. GRAY STONE/GRANULAR
10	143.0	A	F13	3.7 +- 0.2	<3.4 +- 0.0	3.8 +- 0.1	300	20	RED/BROWN IN CRATE
11	113.5	A	K17	80.4 +- 1.9	<32.0 +- 0.0	<2.4 +- 0.0	1000	100	GRAY/BROWN/WHITE IN CRATE P0163 D8 - DICE
12	214.5	A	L16	137.0 +- 2.0	<27.3 +- 0.0	<5.0 +- 0.0	1500	150	GRAY CHUNKS IN PILE - DICE
13	123.5	A	K7	5.4 +- 1.5	<6.2 +- 0.0	6.3 +- 0.4	150	20	GRAY POWDER DRUM D27 - DICE KILN BAY
14	159.5	A	K4	8.9 +- 1.1	<5.6 +- 0.0	6.8 +- 0.4	100	40	BLACK FLOOR DIRT - WEST DICE
15	236.5	A	L3	<1.4 +- 0.0	<4.9 +- 0.0	<1.1 +- 0.0	30	20	BLACK METALLIC FINES F3 - DICE
16	288.3	A	L11	1220.0 +- 5.0	<144.0 +- 0.0	52.1 +- 1.7	10000	1400	GRAY SLAG ROCKS IN DRUM IN FENCE AREA - DICE
17A	191.5	A	O11	3.9 +- 0.9	<3.6 +- 0.0	1.7 +- 0.3	300	200	SOIL AT BULKHEAD DICE LOADING DOCK - SURFACE
17B	159.5	A	O11	3.0 +- 1.1	<6.2 +- 0.0	<1.6 +- 0.0	300	300	SOIL AT BULKHEAD DICE LOADING DOCK - 6"
17C	181.5	A	O11	<4.0 +- 0.0	<4.2 +- 0.0	1.1 +- 0.3	0	80	SOIL AT BULHEAD DICE LOADING DOCK - 12"
18	145.3	A	O14	2.5 +- 0.4	<3.6 +- 0.0	1.7 +- 0.1	60	8	DRAIN IN ALLEYWAY - DICE
19A	185.0	A	O24	1.6 +- 0.8	<4.6 +- 0.0	1.4 +- 0.2	60	6	SOIL AT BULKHEAD AT EAST BLDG - SURFACE
19B	183.0	A	O24	<2.6 +- 0.0	4.3 +- 1.2	<1.6 +- 0.0	60	10	SOIL AT BULKHEAD AT EAST BLDG - 12"
19C	172.0	A	O24	1.2 +- 0.2	<1.6 +- 0.0	0.6 +- 0.1	60	10	SOIL AT BULKHEAD AT EAST BLDG - 24"
20A	140.0	A	B14	5.6 +- 1.1	<4.4 +- 0.0	1.8 +- 0.6	60	10	SOIL NEAR FRONT GATE INSIDE FENCE - SURFACE
20B	171.0	A	B14	1.7 +- 0.2	<1.1 +- 0.0	0.6 +- 0.1	60	10	SOIL NEAR FRONT GATE INSIDE FENCE - 12"
20C	162.3	A	B14	0.9 +- 0.3	<1.2 +- 0.0	0.5 +- 0.1	60	10	SOIL NEAR FRONT GATE INSIDE FENCE - 24"
21A	104.5	A	A8	20.1 +- 1.2	30.2 +- 4.3	10.2 +- 0.5	1300	400	SOIL AT HOT SPOT UNDER NORTH FENCE - SURFACE
21B	135.8	A	A8	114.0 +- 2.3	144.0 +- 9.0	104.0 +- 1.4	3000	600	SOIL AT HOT SPOT UNDER NORTH FENCE - 6"
21C	138.0	A	A8	111.0 +- 2.0	103.0 +- 8.0	103.0 +- 1.4	0	200	SOIL AT HOT SPOT UNDER NORTH FENCE - 15"
22A	84.7	A	C4	3.2 +- 0.5	<3.4 +- 0.0	1.6 +- 0.1	800	120	SOIL AT UTILITY POLE NEAR POOL - SURFACE
22B	204.0	A	C4	4.4 +- 0.3	<4.5 +- 0.0	1.9 +- 0.1	800	120	SOIL AT UTILITY POLE NEAR POOL - 6"
23A	100.0	A	O1	4.7 +- 1.4	<6.0 +- 0.0	<2.1 +- 0.0	60	10	SOIL AT BULKHEAD SW CORNER - SURFACE
23B	180.5	A	O1	3.2 +- 0.8	<3.6 +- 0.0	<2.0 +- 0.0	60	10	SOIL AT BULKHEAD SW CORNER - 6"
23C	215.5	A	O1	<2.2 +- 0.0	<2.9 +- 0.0	<1.6 +- 0.0	60	10	SOIL AT BULKHEAD SW CORNER - 12" HIT SOLID
24A	166.5	A	G1	22.2 +- 1.0	10.6 +- 2.8	1.3 +- 0.6	60	50	SOIL AT WEST FENCE - SURFACE
24B	194.5	A	G1	30.9 +- 1.0	<13.3 +- 0.0	<1.3 +- 0.0	80	70	SOIL AT WEST FENCE - 4" HIT CONCRETE
25A	163.5	A	O29	2.4 +- 0.2	<2.1 +- 0.0	1.3 +- 0.1	60	10	SOIL AT BULKHEAD LOUNGE - SURFACE
25B	160.0	A	O29	1.8 +- 0.4	<2.0 +- 0.0	0.7 +- 0.2	60	20	SOIL AT BULKHEAD LOUNGE - 12"
25C	137.0	A	O29	8.3 +- 1.4	<15.0 +- 0.0	3.5 +- 0.3	0	20	SOIL AT BULKHEAD LOUNGE - 24"
26A	107.5	A	E31	1.6 +- 0.4	<1.5 +- 0.0	0.7 +- 0.1	60	15	SOIL BEHIND WIRE DEPT. SOUTH - SURFACE
26B	320.5	A	E31	6.9 +- 0.4	<3.2 +- 0.0	1.8 +- 0.2	60	20	SOIL BEHIND WIRE DEPT. SOUTH - 12"
26C	162.5	A	E31	3.0 +- 1.0	<5.1 +- 0.0	<1.0 +- 0.0	0	40	SOIL BEHIND WIRE DEPT. SOUTH - 24"
27A	181.5	A	B30	2.2 +- 0.7	<6.4 +- 0.0	<1.5 +- 0.0	60	10	SOIL BEHIND WIRE DEPT. NORTH - SURFACE
27B	137.5	A	B30	<2.4 +- 0.0	<7.0 +- 0.0	1.3 +- 0.4	60	20	SOIL BEHIND WIRE DEPT. NORTH - 6"
27C	187.0	A	B30	4.1 +- 0.7	<6.0 +- 0.0	1.4 +- 0.2	0	20	SOIL BEHIND WIRE DEPT. NORTH - 12"

28A	158.0	A	B24	3.9 +- 0.4	<6.5 +- 0.0	1.7 +- 0.1	60	10	SOIL BEHIND LAB NEAR SUMP - SURFACE
28B	225.5	A	B24	3.2 +- 0.7	<3.4 +- 0.0	<0.9 +- 0.0	60	10	SOIL BEHIND LAB NEAR SUMP - 12"
28C	207.5	A	B24	1.5 +- 0.6	<3.3 +- 0.0	1.0 +- 0.1	60	10	SOIL BEHIND LAB NEAR SUMP - 24"
29	165.0	A	B24	18.2 +- 0.9	<5.8 +- 0.0	<2.6 +- 0.0	600	200	SOIL FROM BRICK SUMP BEHIND LAB
30A	215.1	A	G27	2930.0 +- 10.0	<142.0 +- 0.0	<12.0 +- 0.0	100	400	YARD DIRT UNDER OUTDR STAIR AT WIRE DEPT
30B	151.3	A	G27	21.0 +- 0.0	<20.0 +- 0.0	<1.3 +- 0.0	1500	400	1" ASPHLT @ STAIR WIRE DEPT 4500 DPM/100SQCM ALPHA
31A	243.5	A	H27	1.7 +- 0.0	<6.0 +- 0.0	2.0 +- 0.2	200	50	YARD DIRT UNDER TANK BETWEEN EAST BLDG & WIRE DEPT
32A	240.0	A	H28	256.0 +- 2.0	<21.6 +- 0.0	<2.8 +- 0.0	200	140	DIRT/SAND AT EAST FENCE NEAR LILCO
33A	120.0	A	C25	3.2 +- 0.7	2.7 +- 1.3	0.8 +- 0.2	200	20	SOIL BEHIND LAB AT END OF PORCH
34	209.3	A	F26	24.7 +- 0.7	18.4 +- 3.3	141.0 +- 0.5	500	80	GRAY POWDER FROM SCOOP ELEVATOR WIRE YARD
35A	130.3	B	K34	1.5 +- 1.1	<3.3 +- 0.0	10.9 +- 0.2	60	10	SOIL SE CORNER - SURFACE
35B	186.0	B	K34	2.1 +- 0.5	<4.2 +- 0.0	1.2 +- 0.1	60	15	SOIL SE CORNER - 6" (UNDERGRD WATER)
35C	170.3	B	K34	1.7 +- 0.8	<2.2 +- 0.0	1.2 +- 0.1	60	15	SOIL SE CORNER - 12" (UNDERGRD WATER)
36A	224.5	B	F34	1.7 +- 0.4	<2.2 +- 0.0	1.4 +- 0.1	60	10	SOIL S SIDE - SURFACE (WET AREA)
36B	298.0	B	F34	1.7 +- 0.4	<3.8 +- 0.0	1.0 +- 0.1	60	12	SOIL S SIDE - 6" (WET AREA)
36C	160.8	B	F34	2.5 +- 0.6	<2.4 +- 0.0	1.7 +- 0.1	60	12	SOIL S SIDE - 12" (WET AREA)
37A	192.5	B	A34	1.3 +- 0.4	<2.7 +- 0.0	0.8 +- 0.1	60	10	SOIL SW CORNER - SURFACE
37B	191.1	B	A34	1.2 +- 0.6	<2.8 +- 0.0	1.0 +- 0.1	60	12	SOIL SW CORNER - 6"
37C	189.5	B	A34	1.3 +- 0.5	<2.0 +- 0.0	0.9 +- 0.1	60	12	SOIL SW CORNER - 12"
38	184.5	B	G21	2.2 +- 0.5	19.2 +- 1.6	1.0 +- 0.1	200	50	BLACK PILE AT 2 O'C
39A	215.0	B	F22	3.6 +- 0.3	<6.2 +- 0.0	2.0 +- 0.1	250	40	SOIL BEHIND RAD/S38 PILE - SURFACE
39B	158.6	B	F22	2.6 +- 0.4	<3.2 +- 0.0	1.8 +- 0.1	250	60	SOIL BEHIND RAD/S38 PILE - 6"
39C	133.0	B	F22	6.0 +- 0.5	<5.0 +- 0.0	2.9 +- 0.2	250	60	SOIL BEHIND RAD/S38 PILE - 12"
40A	137.5	B	D23	22.4 +- 1.3	29.7 +- 4.9	42.8 +- 0.8	300	50	SOIL BETWEEN DROP OFF & POND - SURFACE
40B	222.0	B	D23	3.9 +- 0.7	<7.7 +- 0.0	2.6 +- 0.2	250	30	SOIL BETWEEN DROP OFF & POND - 6"
40C	170.5	B	D23	<4.5 +- 0.0	4.8 +- 2.0	2.8 +- 0.3	200	30	SOIL BETWEEN DROP OFF & POND - 12"
41	147.2	B	F21	20.1 +- 0.9	187.0 +- 5.0	110.0 +- 7.0	1000	250	BLACK PILE AT 3 O'C
42	127.7	B	E20	2.2 +- 0.5	<2.9 +- 0.0	1.2 +- 0.3	60	15	GRAY PILE AT 4 O'C
43	129.3	B	D20	8.7 +- 1.4	<12.5 +- 0.0	1.5 +- 0.5	100	25	GRAY SHALE-LIKE PILE AT 5 O'C
44A	187.2	B	E18	<3.3 +- 0.0	<3.2 +- 0.0	1.1 +- 0.4	60	20	SOIL IN CENTER OF RING OF PILES - SURFACE
44B	198.0	B	E18	1.7 +- 1.0	<6.8 +- 0.0	1.3 +- 0.3	60	17	SOIL IN CENTER OF RING OF PILES - 12"
44C	171.5	B	E18	3.5 +- 0.9	<5.2 +- 0.0	<2.1 +- 0.0	60	17	SOIL IN CENTER OF RING OF PILES - 24"
45	118.0	B	H19	6.0 +- 1.4	6.6 +- 2.3	4.7 +- 0.4	60	25	GRAY PILE AT 12 O'C
46A	133.0	B	I18	4.9 +- 1.2	20.6 +- 3.5	20.4 +- 0.6	200	40	SOIL BEHIND PILES AT 11 O'C - SURFACE
46B	160.0	B	I18	2.6 +- 0.8	<8.9 +- 0.0	3.1 +- 0.3	100	30	SOIL BEHIND PILES AT 11 O'C - 12"
46C	170.5	B	I18	3.4 +- 0.8	5.5 +- 1.9	3.2 +- 0.5	100	30	SOIL BEHIND PILES AT 11 O'C - 24"
47A	152.2	B	F17	<1.6 +- 0.0	<2.2 +- 0.0	<0.4 +- 0.0	100	18	PILE OF SOIL AT 9 O'C
48A	185.0	B	E15	2.2 +- 0.5	<2.0 +- 0.0	1.3 +- 0.1	60	15	SOIL BEHIND PILES AT 9 O'C - SURFACE
48B	195.0	B	E15	1.2 +- 0.7	<1.9 +- 0.0	1.2 +- 0.1	60	12	SOIL BEHIND PILES AT 9 O'C - 6"
48C	200.0	B	E15	1.2 +- 0.7	<2.0 +- 0.0	0.9 +- 0.1	60	12	SOIL BEHIND PILES AT 9 O'C - 12"
49A	169.3	B	H18	16.2 +- 1.1	25.9 +- 3.6	35.3 +- 0.7	400	80	SOIL FROM HOT SPOT AT 11 O'C
50A	110.0	B	F2	1.4 +- 0.4	<3.1 +- 0.0	0.6 +- 0.1	60	10	SOIL FROM NW CORNER - SURFACE
50B	130.0	B	F2	1.8 +- 0.4	<1.3 +- 0.0	0.7 +- 0.1	60	15	SOIL FROM NW CORNER - 12"
50C	157.0	B	F2	1.3 +- 0.3	<2.6 +- 0.0	0.7 +- 0.1	60	15	SOIL FROM NW CORNER - 24"
51A	129.3	B	L1	1.5 +- 0.3	<1.3 +- 0.0	0.6 +- 0.1	60	10	SOIL FROM NE CORNER - SURFACE
51B	159.5	B	L1	1.2 +- 0.3	<2.2 +- 0.0	0.6 +- 0.1	60	15	SOIL FROM NE CORNER - 12"
51C	173.6	B	L1	1.4 +- 0.2	<1.0 +- 0.0	0.6 +- 0.1	60	15	SOIL FROM NE CORNER - 24"
52A	105.2	A	A3	1.8 +- 0.8	<5.5 +- 0.0	<1.5 +- 0.0	60	10	SOIL FROM NE CORNER OUTSD FENCE - SURFACE
52B	205.5	A	A3	0.9 +- 0.2	<1.9 +- 0.0	0.4 +- 0.1	60	17	SOIL FROM NE CORNER OUTSD FENCE - 12"
52C	168.0	A	A3	<1.2 +- 0.0	<1.0 +- 0.0	0.5 +- 0.1	60	17	SOIL FROM NE CORNER OUTSD FENCE - 24"
53A	244.0	A	J29	3.1 +- 0.6	<3.4 +- 0.0	<1.3 +- 0.0	60	10	SOIL BETWEEN EAST & LOUNGE BLDGS - SURFACE
53B	147.0	A	J29	3.3 +- 1.3	<6.8 +- 0.0	1.8 +- 0.3	60	25	SOIL BETWEEN EAST & LOUNGE BLDGS - 12"
53C	140.5	A	J29	6.0 +- 1.2	<9.0 +- 0.0	1.6 +- 0.5	60	25	SOIL BETWEEN EAST & LOUNGE BLDGS - 24"
54A	235.4	C	K38	<2.7 +- 0.0	<5.3 +- 0.0	1.4 +- 0.2	60	10	SOIL FROM RUNOFF N CORNER OUTSD FENCE - SURFACE
54B	228.1	C	K38	<0.6 +- 0.0	<0.8 +- 0.0	0.7 +- 0.1	60	15	SOIL FROM RUNOFF N CORNER OUTSD FENCE - 12"
54C	187.6	C	K38	<0.5 +- 0.0	<1.1 +- 0.0	0.5 +- 0.1	60	15	SOIL FROM RUNOFF N CORNER OUTSD FENCE - 24"
55A	254.0	C	S31	<1.9 +- 0.0	<3.1 +- 0.0	0.6 +- 0.2	60	10	SOIL BY SE FENCE AT UNDGRD OIL PIPE - SURFACE
55B	283.0	C	S31	<1.4 +- 0.0	<3.8 +- 0.0	<0.7 +- 0.0	60	10	SOIL BY SE FENCE AT UNDGRD OIL PIPE - 12"

55C	245.5	C	S31	(1.7 +- 0.0	(2.4 +- 0.0	(1.1 +- 0.0	60	10	SOIL BY SE FENCE AT UNDGRD OIL PIPE - 24"
56A	190.5	C	S24	1.5 +- 0.8	(3.2 +- 0.0	(1.7 +- 0.0	60	10	SOIL BY E FENCE AT GATE E OF DICKSON - SURFACE
56B	174.5	C	S24	1.0 +- 0.4	(1.5 +- 0.0	0.6 +- 0.1	60	18	SOIL BY E FENCE AT GATE E OF DICKSON - 12"
56C	188.0	C	S24	(0.7 +- 0.0	(1.2 +- 0.0	0.5 +- 0.1	60	18	SOIL BY E FENCE AT GATE E OF DICKSON - 24"
57A	233.0	C	S10	(2.1 +- 0.0	(5.1 +- 0.0	0.8 +- 0.4	60	12	SOIL BY E FENCE AT BENBOW GATE - SURFACE
57B	221.2	C	S10	2.4 +- 0.8	(3.1 +- 0.0	(1.6 +- 0.0	60	20	SOIL BY E FENCE AT BENBOW GATE - 12"
57C	228.1	C	S10	1.8 +- 0.7	(3.2 +- 0.0	0.8 +- 0.3	60	20	SOIL BY E FENCE AT BENBOW GATE - 24"
58A	163.8	C	R1	(0.6 +- 0.0	(1.2 +- 0.0	0.7 +- 0.1	60	10	SOIL NE CORNER - SURFACE
58B	172.6	C	R1	0.8 +- 0.4	(1.1 +- 0.0	0.5 +- 0.1	60	15	SOIL NE CORNER - 12"
59A	211.5	C	AA2	(1.0 +- 0.0	(0.9 +- 0.0	(0.4 +- 0.0	60	10	SOIL NW CORNER OUTSD FENCE - SURFACE
59B	198.7	C	AA2	0.5 +- 0.3	(1.0 +- 0.0	0.5 +- 0.1	60	15	SOIL NW CORNER OUTSD FENCE - 12"
59C	209.8	C	AA2	(1.4 +- 0.0	(2.0 +- 0.0	0.5 +- 0.1	60	15	SOIL NW CORNER OUTSD FENCE - 24"
60A	212.0	C	O30	(0.5 +- 0.0	(0.9 +- 0.0	0.6 +- 0.1	60	10	SOIL IN OIL TANK BASIN - SURFACE
60B	203.2	C	O30	(0.9 +- 0.0	(1.0 +- 0.0	0.7 +- 0.1	60	10	SOIL IN OIL TANK BASIN (OILY) - 6"
61A	180.5	C	P27	1.9 +- 0.8	(4.2 +- 0.0	(1.5 +- 0.0	1000	160	SOIL FROM HOT SPOT ON OIL BASIN BERM - SURFACE
61B	194.0	C	P27	5.4 +- 0.0	(6.4 +- 0.0	1.6 +- 0.3	300	80	SOIL FROM HOT SPOT ON OIL BASIN BERM - 12"
61C	177.5	C	P27	(2.1 +- 0.0	(3.3 +- 0.0	(1.5 +- 0.0	300	80	SOIL FROM HOT SPOT ON OIL BASIN BERM - 24"
62A	95.0	C	K13	948.0 +- 7.0	(113.0 +- 0.0	(23.0 +- 0.0	2000	1500	SOIL FROM HOT SPOT IN FOREST N OF DICKSON-SURFACE
62B	179.2	C	K13	278.0 +- 3.0	(45.0 +- 0.0	(3.8 +- 0.0	11000	3000	SOIL FROM HOT SPOT IN FOREST N OF DICKSON - 6"
62C	124.4	C	K13	92.0 +- 2.0	(33.0 +- 0.0	(3.8 +- 0.0	10000	1700	SOIL FROM HOT SPOT IN FOREST N OF DICKSON - 12"
63A	181.0	C	O13	2.9 +- 0.8	(5.2 +- 0.0	1.1 +- 0.4	60	10	SOIL FROM SANDY SPOT N OF DICKSON -SURFACE
63B	141.0	C	O13	(3.9 +- 0.0	(4.8 +- 0.0	1.7 +- 0.5	60	10	SOIL FROM SANDY SPOT N OF DICKSON - 12"
63C	200.7	C	O13	(3.7 +- 0.0	(5.5 +- 0.0	1.1 +- 0.3	60	10	SOIL FROM SANDY SPOT N OF DICKSON - 24"
64A	247.8	C	F10	1.5 +- 0.6	(2.7 +- 0.0	1.1 +- 0.3	60	10	SOIL FROM LANDFILL RUNOFF NEAR SPHERE - SURFACE
64B	189.0	C	F10	1.3 +- 0.0	(3.2 +- 0.0	(0.7 +- 0.0	60	12	SOIL FROM LANDFILL RUNOFF NEAR SPHERE - 6"
64C	207.5	C	F10	(2.1 +- 0.0	(5.6 +- 0.0	0.9 +- 0.3	60	12	SOIL FROM LANDFILL RUNOFF NEAR SPHERE - 12"
65A	177.5	C	C8	(2.6 +- 0.0	(3.0 +- 0.0	(0.8 +- 0.0	60	10	SOIL FROM SPRING S OF LANDFILL
66	207.0	C	E5	2.5 +- 0.7	4.6 +- 1.4	3.1 +- 0.3	200	20	SLAG ROCKS FROM LANDFILL S OF PROPANE TANK
67	217.5	C	C5	(2.0 +- 0.7	(2.7 +- 0.0	1.3 +- 0.3	60	12	SAND FROM LANDFILL SW OF PROPANE TANK
68	209.0	C	E3	(2.2 +- 0.0	(3.8 +- 0.0	1.5 +- 0.2	60	10	MATERIAL FROM LANDFILL AT FENCE NEAR PROPANE TK
69	144.0	C	C4	173.0 +- 3.0	120.0 +- 10.0	134.0 +- 2.0	4000	1000	BLACK PILE IN LANDFILL E OF PROPANE TANK
70	200.5	C	F2	38.3 +- 1.3	(18.0 +- 0.0	88.2 +- 1.0	2000	400	BROWN PILE IN LANDFILL N OF PROPANE TANK
71	161.4	C	H2	283.0 +- 3.0	256.0 +- 15.0	192.0 +- 2.0	10000	1400	SLAG ROCKS FROM LONG PILE NE OF PROPANE TANK
72	235.0	C	G4	(1.7 +- 0.0	(4.3 +- 0.0	1.5 +- 0.2	60	20	MATERIAL FROM LANDFILL IN GULLY E OF PROPANE TANK
73A	238.5	C	L2	(2.6 +- 0.0	(5.4 +- 0.0	1.0 +- 0.3	60	11	SOIL FRM RUNOFF BETWEEN LANDFILL & DICKSON LANE
74A	231.2	C	G13	1.2 +- 0.7	(2.8 +- 0.0	(1.6 +- 0.0	60	10	SOIL FROM LANDFILL RUNOFF NEAR LOWER POND - SURFAC
75A	161.0	C	A18	(0.9 +- 0.0	(1.2 +- 0.0	0.6 +- 0.1	60	10	SOIL FROM MID-SE CORNER
76A	176.0	C	A10	0.7 +- 0.4	(1.3 +- 0.0	0.5 +- 0.1	60	10	SOIL FROM W SIDE AT FENCE
80A	150.0	C	O27	(2.5 +- 0.0	(8.3 +- 0.0	1.6 +- 0.3	100	20	SOIL FROM MUD POOL S OF WAREHOUSE
81A	202.0	C	O29	6.2 +- 0.8	(7.3 +- 0.0	5.1 +- 0.3	60	30	SOIL FROM 2ND MUD POOL S OF WAREHOUSE
82	185.9	C	M25	11.0 +- 0.8	9.2 +- 3.5	10.8 +- 0.4	250	20	SPILLED BLACK ORE S OF WAREHOUSE
83A	136.3	C	J27	5.8 +- 1.2	(5.8 +- 0.0	7.7 +- 0.4	60	20	SOIL FROM OIL TANK BERM SW OF WAREHSE, W OF TANK
84A	178.0	C	J31	(3.3 +- 0.0	(3.2 +- 0.0	0.7 +- 0.3	60	10	SOIL FROM OIL TANK BERM, SW OF TANK
85A	324.7	C	K37	0.9 +- 0.5	(1.8 +- 0.0	1.3 +- 0.1	60	20	SOIL FROM SW CORNER POND RUNOFF INSIDE FENCE

TABLE 4.3
LI TUNGSTEN CO., DICE BUILDING
RADON/THORON PROGENY AIRBORNE CONCENTRATIONS

TIME	LOCATION	RADON/THORON AIRBORNE CONCENTRATIONS Bq/m^3 (pCi/l)					WORKING LEVEL(WL)	
		Po-218	Pb-214	Bi-214	Pb-212	Bi-212	GRAB*	INTEGRATING**
8/29/89 10:54 am	East Dice	36.6 (1.0)	8.1 (0.22)	7.4 (0.2)	65.6 (1.8)	11.7 (0.32)	0.23	0.33
8/29/89 11:39 am	West Dice	39.9 (1.1)	32.7 (0.88)	27.2 (.74)	18.2 (.49)	9.95 (.27)	0.07	
8/29/89 12:20 pm	Central Dice	39.6 (1.1)	32.2 (.87)	20.2 (.55)	14.0 (.38)	3.0 (.08)	0.06	0.09
8/29/89 1:00 pm	Outside Entrance	1.72 (.05)	1.3 (.04)	1.1 (.03)	0.01 (.0003)	0.03 (.0008)	4.0E-04	

* Grab filter sample -- Sampling time 30 minutes; Total WL (Rn-222 and Rn-220 progeny)
** Alpha Prism Integrating Monitor -- Sampling time 16.5 hours; Thoron WL (Rn-220 progeny)

Applicable limits for non-occupational exposure:

111 Bq/m^3 (3 pCi/l) Rn-222 and progeny (NYS CR 38)

370 Bq/m^3 (10 pCi/l) Rn-220 and progeny (NYS CR 38)

148 Bq/m^3 (4 pCi/l) Rn-222 and progeny (EPA guidline)

The data in this table were provided by the US Dept. of Energy, Environmental Measurements Laboratory.

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5.0 DISCUSSION

5.1 EXTERNAL RADIATION LEVELS

Some materials and equipment have been found to cause gamma radiation levels of 1 to 3 mR/hr @ 1 cm and beta-gamma radiation levels estimated to be up to 65 mR/hr. Radiation levels drop off rapidly as one moves a few feet from a source. Ambient, whole body, gamma radiation fields range from 0.01 mR/hr to 0.03 mR/hr.

Eight specific locations were found to have gamma radiation levels significantly higher than other areas of the plant. These sources emitted gamma radiation levels greater than 1 mR/hr and beta-gamma levels greater than 3 mR/hr. One additional area exhibited elevated gamma levels beyond the property line. These 9 areas of concern are described below:

1. parcel A, grid A4: in yard area near north fence, large slag rocks (~1 meter in diameter) reading 1.4 mR/hr gamma, 10,000 cpm (approx. 3 mR/hr) beta-gamma, 175 pCi/g Th-232, and 60 pCi/g Ra-226; Gamma exposure through fence (property boundary on Herb Hill Road) is 160 uR/hr, dropping to background levels in the street.

2. parcel A, grid Q9 and L11: in Dice Bldg., 1-30 gal. drum and 6 two-gallon pails reading > 3 mR/hr gamma and 12,000 cpm (approx. 3.5 mR/hr) beta-gamma; (remediated)

3. parcel A, grid I17: in Dice Bldg., 1 three-gallon pail and 2 small furnaces (1'x1'x2') reading > 3 mR/hr gamma and 100,000 cpm (approx. 30 mR/hr) beta-gamma; (remediated)

4. parcel A, grid D30: in Wire Plant, 2 two-gallon pails and other bagged materials in a yellow radwaste box reading > 3 mR/hr gamma; (remediated)

5. parcel A, grid F28: in Wire Plant, a 30 gallon drum containing about 200 lbs of thorium metal chunks reading 65 mR/hr beta-gamma and 66,000 pCi/g Th-232 (ref: EPA analysis); and a furnace (3'x2'x2') reading 50,000 cpm (approx. 15 mR/hr) beta-gamma; (remediated)

6. parcel B, grid J19: in heavily vegetated area, corroded 55-gallon drum containing soil, reading > 3 mR/hr gamma and 40,000 cpm (approx. 12 mR/hr) beta-gamma; (remediated)

7. parcel C, grid H2: filled area on north portion, pile (approx 25'x 6' x 3' high) of small slag rocks reading 1.4 mR/hr gamma, 10,000 cpm (approx. 3 mR/hr) beta-gamma, 283 pCi/g Th-232, 256 pCi/g U-238, and 192 pCi/g Ra-226;

8. parcel C, grid J13-14: approx. 2000 sq.ft., heavily vegetated area north of Dickson Warehouse: soil contaminated with suspected pure thorium, reading 3 mR/hr gamma, 15,000 cpm (approx. 4.5 mR/hr) beta-gamma, 948 pCi/g Th-232, and no detectable U-238 or Ra-226;

9. Under north fence, parcel A, grid A8: contaminated soil under controlled area fence approx. 45' long x 4' wide, reading 0.7 mR/hr gamma, 300 cpm beta-gamma, 114 pCi/g Th-232, 144 pCi/g U-238, and 104 pCi/g Ra-226. Radiation levels on uncontrolled side of fence: 300 uR/hr at ground surface, dropping to background levels in the street.

5.2. SURFACE CONTAMINATION

Spilled ore and slag are not considered surface contamination because the radionuclides are trapped within the ore matrix and do not adhere to the surface on which the ore is located. Radionuclide concentrations in the ore and most slags are too low to be detected in quantities collected by wipe tests. Alpha scintillation measurements and wipe tests of surfaces covered with ore dust have not shown any significant radioactivity. The higher level slag rocks and intermediate process materials do show detectable alpha radiation emitted from their surfaces, however, the alpha levels are low relative to the beta-gamma levels emitted.

Only a few areas of the tungsten processing plants showed true surface contamination. Some steel vats in the mixing room of the Dice Building and 1 empty steel tank near the east building with an open inspection port showed total alpha contamination levels of 4000 to 8000 dpm/100 sq cm. Beta-gamma contamination of these surfaces were approximately 1.5 to 2 mR/hr at 1 cm. Contamination of these steel surfaces may have occurred from contact with the various radioactive elements while dissolved in the various acidic or basic solutions used in the tungsten refining process. Many other tanks and vats exhibiting elevated levels of gamma radiation may also prove to have internal surface contamination, however, gaining internal access to test all such items was not possible during this survey due to the presence of unknown and potentially hazardous chemicals.

More surface contamination of floors and equipment was expected in the laboratory and wire plant because about 200 lbs of thorium metal, a thorium process furnace, and thorium contaminated asphalt were found in and around the area. Only 2 wipe samples out of 274 showed any significant alpha contamination.

5.3 ASSESSMENT OF AIRBORNE RADIONUCLIDES

The four air samples collected in the Dice Building for long-lived radionuclides showed no detectable activity. This is expected because there were no machinery, furnaces or other processes operating that would have caused contaminated materials to become airborne.

Radon, an inert gas, will emanate from a stationary pile of radium bearing material even when no mechanical disturbance is occurring. Thus, easily detectable radon levels were found in the Dice Building where most of the ore is stored.

The Radon-220 and 222 daughter concentrations measured by the Dept. of Energy in the Dice Building were relatively low. The highest radon-220 (thoron) daughter concentration found was 1.8 pCi/l (as compared to NYS CR 38 limit of 10 pCi/l for the general public). The highest radon-222 daughter concentration found was 1.1 pCi/l (as compared to NYS CR 38 limit of 3 pCi/l and EPA guideline of 4 pCi/l for the general public).

5.4 RADIOACTIVITY IN SOIL AND PROCESS MATERIALS

5.1.1 Process Materials

There are many different types of ores, intermediate process materials, and waste products present at Li Tungsten. Their colors, densities, and grain size vary widely as can be seen in their descriptions in Table 4.1. These materials (ores, intermediate process materials and waste products) are identified as such from visual observations of containers, labels and their proximity to various types of process equipment.

Ores and intermediate process materials (samples 1-7, 9-15, and 34) stored in and around the Dice Building average 23 pCi/g thorium-232, 27 pCi/g uranium-238, and 21 pCi/g radium-226. Typical concentrations in raw, unprocessed ore are about 10 pCi/g for all thorium and uranium chain nuclides.

Materials thought to be waste products are present on all three parcels. They occur in piles seemingly discarded in out-of-the-way locations. They vary widely in consistency from brown and black powders to hard rocks of slag ranging from a few inches to several feet in diameter. Radionuclide concentrations range from background to over 1000 pCi/g thorium in these materials. Radionuclide concentrations in the waste products are generally greater than those in raw ore because as the tungsten is removed, the mass of the remaining material decreases thus concentrating the radionuclides. Other physical and chemical processes during tungsten refining cause further concentration of certain minerals and radionuclides to very high levels (i.e., > 1000 pCi/g) in selected waste products (see next section).

About 15 to 20 large slag rocks, 3' in diameter, were found on parcel A, having a concentrations of 175 pCi/g Th-232 and 59.9 pCi/g Ra-226.

5.1.2 Chain Equilibria

Samples of unprocessed ore showed both thorium and uranium chain equilibria, i.e., daughter radionuclides were found in approximately equal concentrations to that of the parent radionuclides. Samples of intermediate process materials and waste products showed highly disturbed uranium chain equilibria and slightly disturbed thorium chain equilibria. Uranium chain disequilibrium occurs because of the dissimilar physical properties of uranium and radium, e.g., radium (a calcium analog) will float to the surface of a furnace melt with the slag. The uranium, having a density equivalent to tungsten (19.3 g/cc), will sink to the bottom. Other such separations are likely in the various chemical ore digestion processes that may have been performed at Li Tungsten. Uranium chain disequilibrium will remain for thousands of years because of the long half-lives of the radionuclides.

Thorium chain equilibrium also will be disturbed by physical and chemical processes, however, equilibrium will be restored within 60 years or less because of the relatively short half-lives of the thorium daughter nuclides. Most process material samples at Li Tungsten show thorium chain nuclides to be near equilibrium probably because they are relatively old materials (20-30 yrs).

All process materials showed detectable levels of both uranium and thorium chain nuclides. However, some soil and asphalt samples showed thorium only. This contamination has probably resulted from purification and processing of thorium metals and/or solutions not related to the tungsten process. As discussed above, after thorium purification, the daughter nuclides will grow in-to equilibrium over a 60 year period. Thus, the age of a batch of pure thorium metal, or contamination resulting from such, can be estimated from the ratio of the daughters to the parent.

5.1.3 Soil

Soils tested around the perimeter of the plant contained radionuclides within normal background concentrations except for sample location 21, grid A8, parcel A. At this location, waste appears to have been buried or spilled along a 45' section of the fence next to Herb Hill Road. Because some of the contaminated soil appears to be outside of the fence, this area is of some concern. However, the contamination seems to covered by a layer of lower level radioactivity soil and sod which should prevent its spread until remediation is performed.

The soil around sample location #17 at the end of the Dice Building loading dock at the bulkhead, showed a general gamma radiation level of 300 uR/hr but near background radionuclide concentrations. The source or volume of contaminated soil may have been relatively small and thus was missed when the soil samples were collected.

One area of highly contaminated soil was found in the heavily vegetated area, north of Dickson Warehouse (sample location # 62). This area is cluttered with heavy debris such as concrete slabs, rusted drums, and piles of soil, wood, and rocks. Sample 62A (948 pCi/g thorium) consisted of rich, forest humus, not rocky slag as would be expected from observation of other hot spots. No U-238 or Ra-226 were detected in these samples. These facts indicate that a highly concentrated thorium powder or liquid were deposited there. Th-232 daughters were in about 75% equilibrium indicating that the age of the contaminant is about 30-40 years. This age range is also supported by the presence of trees growing from the contaminated area that are about a foot in diameter.

5.1.4 Contaminated Asphalt

Another location where concentrated thorium was thought to have been spilled is on an asphalted area between the wire department and the East Building (Sample locations 30, 31 and 32). Fixed alpha levels on the asphalt were about 4500 dpm/100 sq cm and gamma levels about 400 uR/hr at 1 cm. No U-238 or Ra-226 were detected in the samples. The surface of the asphalt was mostly free of ore dust.

5.1.5 Potential for Radionuclide Migration

Three pond, or swampy, areas exist on the site from which five sediment samples were collected. Samples P1 (parcel B, grid D24) and P2 (parcel B, grid G26) did not exhibit elevated levels of radionuclides. The presence of contaminated soil and waste piles uphill and adjacent to the pond suggests that there is very limited contaminant migration away from the piles. A similar situation exists at the filled area on the north portion of parcel C. While a large quantity of contaminated materials exist there, samples collected from run-off swales (sample 73, grid L2; sample 72, grid H4; sample 64, grid G10) and a downhill pond (sample P5, parcel C, grid F17) showed background levels of radionuclides.

Sediment samples P3 (grid L35) and P4 (grid P34,35) from the pond near the large oil tank on parcel C did should slightly elevated concentrations. Soil samples 84 (parcel C, grid K37) and 54 (parcel C, grid K38) from the run-off swale southwest of the pond, indicate that radionuclides were not being significantly transported from the site via surface water run-off.

5.1.6 Materials in Large Tanks

Several large tanks (5000 - 20,000 gallon cap.) emit gamma radiation levels of 30 to 100 uR/hr. They include tank numbers: 231, 232, 233, 1334 (empty), L138, 287, K4, K5, K6, K7, K8, and K9. Some are constructed of wood, others of steel. These readings indicate that contaminated liquid, contaminated sludge, or contaminated interior walls are present within the tank. Other tanks in the East Dice and West Dice Buildings may also emit elevated levels of gamma radiation, however, higher levels of gamma radiation from nearby piles of solid process materials may have masked radiation emitted from the tanks.

Samples of the liquid contents of many tanks were collected by Direct Environmental, Inc, in November, 1989. Gamma spectroscopic analyses show very low radionuclide concentrations (see Appendix D). The three outdoor, wooden tanks (231, 232 and 233 on parcel A, grid 24-I,J,K), reading 80-100 uR/hr, are filled with what appears to be clean rainwater. Thus, the walls themselves must be the source of the radiation. Tank # 1334 (parcel A, grid 24N), an empty steel tank with an open port, had slightly contaminated internal walls reading about 1000 cpm on the GM pancake probe and 1600 dpm/100 sq.cm. total alpha. Sludge samples from the tanks have not be studied at this time.

REFERENCE 5

11045/2-91

1 of 2

RECORD OF TELEPHONE CONVERSATION

DATE 5/3/95
10:45

TO Captain's Cove Condominium Site
NAME/FILE NO.

FROM Mike Heffron

CLIENT/PROJECT EPA ARCs II

SUBJECT Wastes from Li Tungsten disposed at Captain's Cove

CHARGE: DEPT. NO. ______ CLIENT SYMBOL ______ OFS NO. ______

DISCUSSION WITH Frank Pena - Former Li Tungsten Employee (516) 759-9896

- Mr. Pena worked for Li Tungsten from 1974 until the operations closed in 1985.
- He worked in the screening department and carbide building.
- He personally never saw waste being disposed at the Captain's Cove condo site, or Garvies Point as he referred to it.
- During his employment at Li Tungsten he spoke with many of the "old timers" who worked at the site for many years. Many of the employees that worked at the site in the 1950s and 1960s stated they routinely dumped waste slag etc. at the Garvies Point site.
- He stated that employees used to take boxes or crates of material (slag etc), using a fork lift, drive down the road and dump the material into the landfill.

BY [signature] 5/3/95
NAME TITLE DEPT. NO.

CC:

103520

11046/2-91

Ref. 2
2 of 2

RECORD OF TELEPHONE CONVERSATION

DATE 5/3/95
10:45

TO Captain's Cove Condominium Site
NAME/FILE NO.

Page 2 of Telecon

FROM Mike Heffron

CLIENT/PROJECT

SUBJECT

CHARGE: DEPT. NO. CLIENT SYMBOL OFS NO.

DISCUSSION WITH

- Wastes used to be dumped in the parking lot near the main building, across the street by the woods, back by the reduction building and hydrogen tank.

- He stated that while he worked at Li Tungsten, material was dumped on the ground or into Glen Cove Creek.
  - Large crocks or open vats used for degreasing parts was filled with chloroethene or acetone, used to degrease parts, and then dumped right onto the ground.
  - Wastes were dumped into pipes and trenches leading into Glen Cove Creek.

- Mr. Pena stated that the owners/operators of Li Tungsten were always in dispute with the workers/unions. He witnessed employees dumping up to 50,000 gallons of caustic soda into Glen Cove creek just to spite the owners since it cost several thousand dollars for the soda hydroxide flakes.

- Mr. Pena stated that we was meeting Mr. Connolly of EPA to walk over the Li Tungsten site and discuss the former disposal practices.
  Mr. Connolly (212) 637-4291

BY
NAME TITLE DEPT. NO.

CC:

103521

REFERENCE 6

Vol. 6
1 of 148

02-9003-01-SI
REV. NO. 0

FINAL DRAFT
SITE INSPECTION REPORT
LI TUNGSTEN
GLEN COVE, NEW YORK
VOLUME 1 OF 5

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO. 02-9003-01
CONTRACT NO. 68-01-7346

FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 28, 1990

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY:

Joanne L. Wagner for
RICHARD FEINBERG
PROJECT MANAGER

Steven Okulewicz
STEVEN OKULEWICZ
SITE MANAGER

REVIEWED/APPROVED BY:

Ronald M. Naman
RONALD M. NAMAN
FIT OFFICE MANAGER

103523

Ref. 6
2 of 48

SITE INSPECTION REPORT: LEVEL III

PART I: SITE INFORMATION

1. Site Name/Alias Li Tungsten/ LI Tungsten/ Wah Chang Smelting and Refining Company of America Inc./Wah Chang Teledyne Inc./National Reconditioning Company

   Street 63 Herb Hill Road

   City Glen Cove　State New York　Zip 11542

2. County Nassau　County Code 059　Cong. Dist. 3

3. EPA ID No. NYD986882660

4. Block No. 21A and 31G　Lot Nos. 21-A-14, 15, 16-1, 16-2, 142, 431, 495, 544, 545; 31-G-311

5. Latitude 40° 51' 36" N　Longitude 73° 38' 25" W

   USGS Quad. Sea Cliff, New York

6. Owner Glen Cove Development Company　Tel. No. Unavailable

   Street 34 Market Street

   City Baltimore　State Maryland　Zip 21202

7. Operator Li Tungsten　Tel. No. (516) 676-1313

   Street 63 Herb Hill Road

   City Glen Cove　State New York　Zip 11542

8. Type of Ownership

   ☒ Private　☐ Federal　☐ State
   ☐ County　☐ Municipal　☐ Unknown　☐ Other NA

9. Owner/Operator Notification on File

   ☐ RCRA 3001　Date NA　☐ CERCLA 103c　Date NA
   ☒ None　☐ Unknown

10. Permit Information

Permit	Permit No.	Date Issued	Expiration Date	Comments
SPDES	NYD008249	Unknown	1987	Cooling Water Discharge
Radiation Source Material License	743-0464	3/19/64	Cancelled 1971	License to store, transport, and deliver radioactive compounds

Ref. 6
3.5 45

Air Permit	Unknown	Unknown	Unknown	Air Discharges from smelting operation

11. Site Status

☐ Active ☒ Inactive ☐ Unknown

12. Years of Operation 1941 to June 1985

13. Identify the types of waste sources (e.g., landfill, surface impoundment, piles, stained soil, above- or below-ground tanks or containers, land treatment, etc.) on site. Initiate as many waste unit numbers as needed to identify all waste sources on site.

(a) Waste Sources

Waste Unit No.	Waste Unit Type	Facility Name for Unit
1	Drums	55- and 30-Gallon Drums
2	Piles	Waste Piles /Mounds
3	Crates	Wooden Crates
4	Tanks	Tanks
5	Surface Impoundments	Mud Pond/Mud Holes/Oil Recovery Sumps
6	Landfill	Landfill
7	Stained Soil	Stained Soil
8	Buried Surface Impoundment	500,000-Gallon Fuel Oil Tank

(b) Other Areas of Concern

Identify any miscellaneous spills, dumping, etc. on site; describe the materials and identify their locations on site.

There are five other areas or items of concern at this site. First, there is a radiation hazard. The facility smelted monazite sand and tungsten ore (scheelite/wolframite), which contain naturally radioactive thorium-, uranium-, and radium-bearing compounds, to produce tungsten carbide powder and other tungsten-containing products. In addition, commercially prepared thorium oxide, thorium nitrate, and uranium (uranyl) acetate were used during ore processing. These radioactive compounds are present in the crates, piles, drums, and landfill areas on the site in various concentrations. A previous radiation survey of the facility conducted by Enviropact Services in 1988 determined gross alpha radiation of three samples of unknown media from various waste containers to range from 64 to 251 nanocuries per gram (nCi/g). Another survey, conducted by the NDL Organization in 1989 for the entire site, detected various levels of radiation, with the highest level detected at 1,000 picocuries per gram (pCi/g) in tungsten waste products. Background radiation levels in soil for New York State are 55 pCi/g for thorium and 180 pCi/g for uranium. Some of the large process solution vats and equipment in the facility are also radioactive. Soil by the fence along the southern boundary of Herb Hill Road is also radioactive, with levels of 160 microRoentgen per hour (uR/hr) to 300 uR/hr from material either on the other side of the fence or buried below the fence (Ref. Nos. 2, 3, 13, 29, 33, 37).

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The second area of concern is the Dice and East Buildings. Both buildings contain many crates and stacks of 55-gallon drums and wooden barrels of raw and reprocessed ore material. Rainwater has flooded both of these buildings to a depth of approximately 1 foot; this water may also contain dissolved heavy metals and be slightly radioactive from contact with the ore material (Ref. Nos. 4, 13, 31, 34, 35, 37, 49, 51, 52).

The third item of concern is asbestos. This material is found in siding shingles, roofing tiles, tank covers, and pipe wrapping. All of these items are in a state of decay and pieces of asbestos-containing materials have been found on the ground (Ref. Nos. 4, 13, 25, 26, 48, 52).

The fourth item of concern is the empty 55- and 30-gallon drums. Many of these drums are found scattered in disordered piles and stacks throughout the site; some of these drums, though empty, may be radioactive and create both a chemical and physical hazard on the site (Ref. No. 25).

The fifth and last area of concern is the Glen Cove Landfill, located on the south side of Garvies Point Road near the Li Tungsten facility. According to the City Historian for Glen Cove, this area (Section 21, Block 259, Lot 1) served as a municipal landfill and may have received waste ore and other waste materials from the Li Tungsten facility. Analyses of soil samples collected from this area by the Nassau County Department of Health revealed above background levels of radiation. The construction of a condominium project was halted due to the discovery of radiation and hazardous waste in the area. This area should be inspected and sampled for radioactive and other hazardous waste (Ref. Nos. 30, 36).

14. Information available from

Contact Amy Brochu **Agency** U.S. EPA **Tel. No.** (201) 906-6802

Preparer Steven Okulewicz **Agency** NUS Corp. Region 2 FIT **Date** Sept. 28, 1990

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PART II: WASTE SOURCE INFORMATION

Drums

There are 3,850 55-gallon drums and 4,333 30-gallon drums on site that contain solid, sludge, and liquid materials; some drums contain raw and processed tungsten ores and residues. The total number of drums containing solid waste is 8,052; another 131 drums contain liquids. The total capacity of these drums is approximately 341,740 gallons. The majority of the drums on site are known to contain radioactive ores and residues including uranium, thorium, radium, organics such as carbon tetrachloride, perchloroethylene, and PCBs, and inorganic materials which include lead, tungsten, chromium, cadmium, arsenic, copper, nickel, zinc, barium, hydrochloric acid, hydrofluoric acid, nitric acid, and cyanide. The drums are scattered around the site and some are clustered in several buildings. Some are suspected to be buried within the landfill area, while others are stacked within or around the Dice Building, the Dickson Warehouse, the north and south sides of the Carbide Building, and at the southern corner of Herb Hill Road and Garvies Point Road. Some of these drums are overstacked, some have toppled, some are badly corroded, and some are leaking their contents upon the ground either within or around many of the buildings on site. The condition of the drums suspected to buried within the landfill area is unknown (Ref. Nos. 2, 4, 22, 26, 49, 50, 52). Figures 1 and 2 provide a site location map and a site map, respectively. Figure 3 provides a monitoring well location map.

Waste Piles

There are nine waste piles located on the site. Seven black and grey waste piles are located around the natural pond in the landfill area between Herb Hill Road and The Place. One mound of waste is located behind and to the west of the Reduction Building and another waste pile is located north of the Dickson Warehouse. All of these piles are uncovered and there is no containment. The total volume of these piles is estimated to be greater than 325 yds^3; the quantity of hazardous waste within these piles is unknown. The physical states of the waste within these piles are solids, powders, and sludges. The specific substances known to be present in these piles are the ores and residues of tungsten processing. These substances include lead, chromium, barium, copper, zinc, arsenic, cadmium, nickel, uranium, radium, thorium, and cyanide. All of the piles are known to contain radioactive compounds of uranium, thorium, and radium. The piles adjacent to the Dickson Warehouse and to the west of the Reduction Building have been roped off and marked with placards that indicate hazardous radiation; the seven other waste piles are unmarked and are not roped off (Ref. Nos. 2, 4, 22, 29, 37, 49, 52).

Crates

There are 719 wooden crates on site whose volume is estimated to be 705 cubic yards. These wooden crates are found in various areas of the site, but are located mainly within the Dickson Warehouse Building, on the north side of the Carbide Building, and within the Dice/ Warehouse Building. Some

D

(QUAD) SEA CLIFF, N.Y.

SITE LOCATION MAP

LI TUNGSTEN, GLEN COVE, N.Y.

SCALE: 1" = 2000'

FIGURE 1

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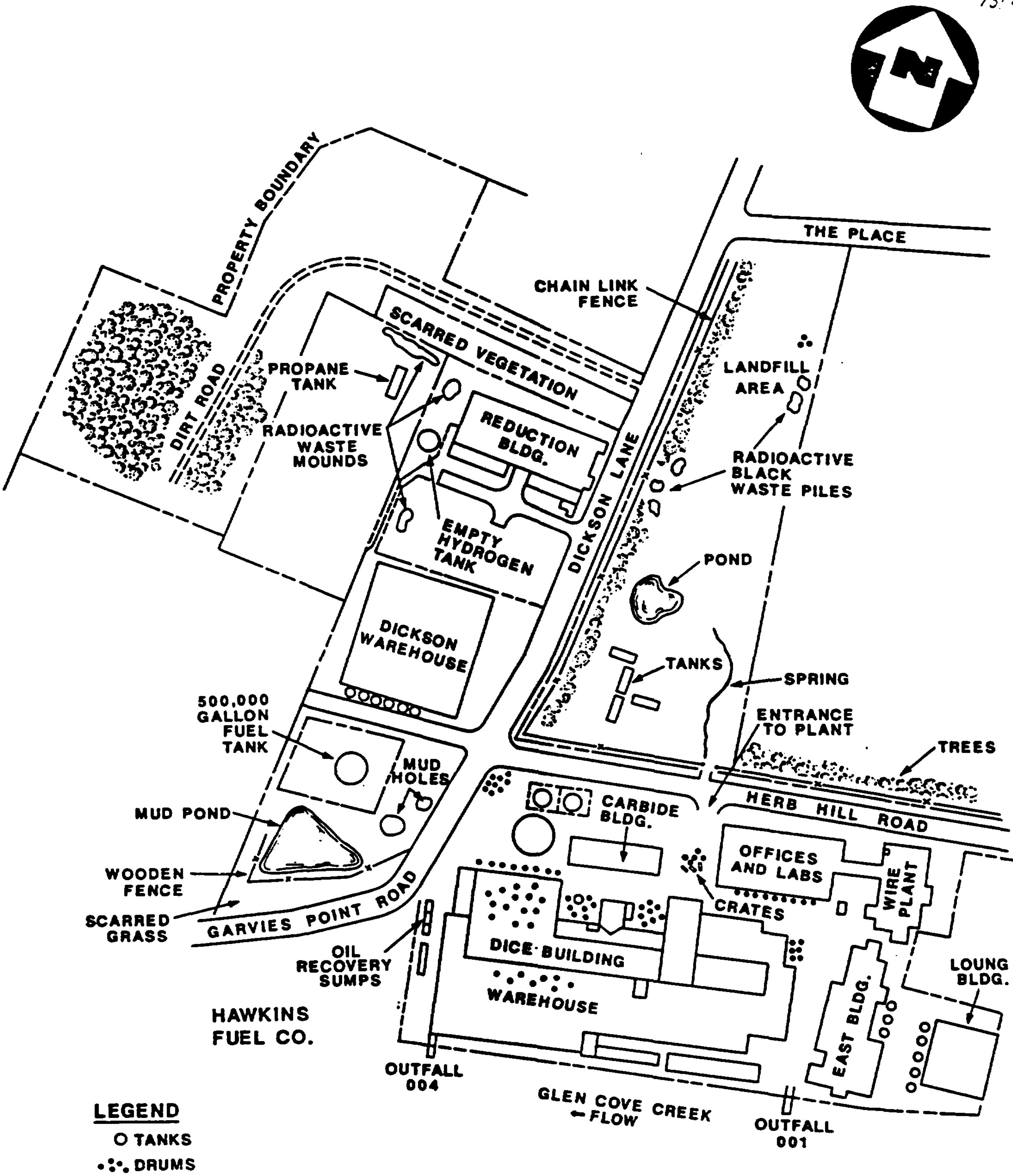

FIGURE 2

SITE MAP

LI TUNGSTEN, GLEN COVE, LONG ISLAND, N.Y.

NOT TO SCALE

NUS CORPORATION

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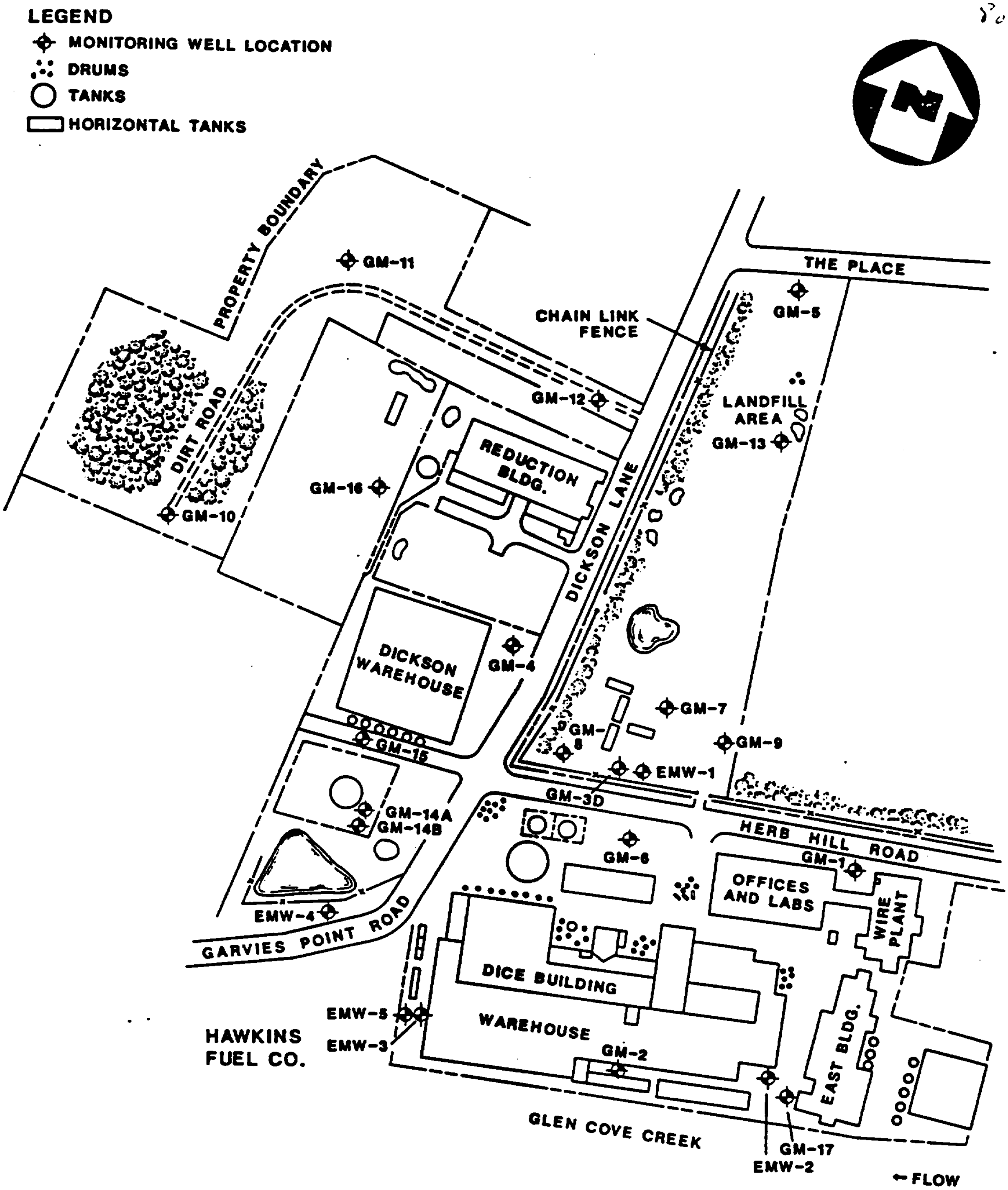

FIGURE 3

MONITORING WELL LOCATION MAP

LI TUNGSTEN, GLEN COVE, LONG ISLAND, N.Y.

NOT TO SCALE

NUS CORPORATION

103530

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of these crates are located in open, uncovered areas outside of the buildings; these crates have been observed to be badly weathered or collapsed and spilling their contents upon the ground. Specific hazardous substances known to be present in these wooden crates are raw and processed tungsten ores that contain heavy metals including uranium, thorium, radium, lead, cadmium, chromium, copper, arsenic, zinc, nickel, and barium (Ref. Nos. 4, 13, 26, 37, 49, 52).

Tanks

There are 224 tanks made of wood, metal, or fiberglass on site. The majority of these tanks are located in the Dice Building, the Warehouse Building, the East Building, the Loung Building, to the west of the Dice Building, at the southern end of the landfill area, and to the northwest of the Carbide Building. A large aboveground 500,000-gallon fuel oil tank is located to the north of the Mud Pond. There are also two 275-gallon fuel oil tanks and one 200-gallon fuel oil tank present on site. The total capacities of 86 other tanks found to have contained liquids was estimated to be 518,131 gallons. The volume of liquids actually present in these tanks is unknown; the volume contained in 51 tanks from which samples were collected was estimated at 373,000 gallons. Two pressurized tanks also remain on site; one contains aqueous ammonia and the other contains propane gas. The volume of gas remaining in these tanks is unknown. The remaining 132 tanks either contain residual solids or are empty. The physical condition of some of these tanks is unknown. Many of the tanks are corroded or have collapsed linings. Fifty tanks have been inspected internally and externally for leaks or rupture. The contents of two tanks determined not to be secure have been sampled, drained, and drummed for disposal by Hart Environmental Consultants. None of these tanks are diked or have any secondary containment structures. The specific hazardous substances known to be present within these tanks include ammonium paratungstate (APT), ammonium hydroxide, spent hydrochloric acid, hydrochloric acid, aqueous ammonia, sodium hydroxide, tungsten acid, calcium chloride, cobalt chloride solution, sodium tungstate solution, and process solutions containing heavy metals that include arsenic, chromium, lead, thorium, tungsten, and radium. There are also approximately eight underground tanks at unspecified locations and of unknown integrity on site (Ref. Nos. 4, 13, 25, 26, 41, 49, 52).

Surface Impoundments

There are six surface impoundments on the site: two unlined settling ponds, referred to as the Mud Holes, a lined settling pond known as the Mud Pond, and three concrete oil recovery sumps. The former three impoundments are located immediately south and southeast of the 500,000-gallon fuel oil tank along Garvies Point Road. The exact volumes of the Mud Pond and Mud Holes are unknown; the quantity of waste in them is also unknown. The Mud Pond was lined with a plastic/rubber liner, but has been leaking into the groundwater and surface soil, causing scarred vegetation. A plume of waste/process water which contains heavy metals has been detected in the vicinity of the Mud Pond and the Mud Holes.

The three concrete oil recovery sumps are located west of the Dice/Warehouse Building and are connected via pipes to the Mud Pond/Mud Holes. None of these impoundments are covered. The total area of these impoundments is estimated to be 11,760 ft^2. The hazardous substances known to be present include sludges, fines, slurries, and liquids that contain lead, chromium, cadmium, arsenic, beryllium, antimony, cobalt, copper, manganese, nickel, zinc, sulfate compounds, chloride compounds, and PCBs (Ref. Nos. 4, 21, 22, 26, 46, 49, 50, 52).

Buried Surface Impoundment

A buried surface impoundment was located in the vicinity of and under the present location of the 500,000-gallon fuel oil tank on Garvies Point Road. The only documentation of this impoundment is in an aerial photograph of the site from 1950 (Ref. No. 46). This impoundment is suspected to have received waste/process waters from the Li Tungsten facility prior to the construction of the Mud Pond, Mud Holes, and fuel oil tank. The area of this impoundment, as measured from the aerial photograph, is approximately 5,100 ft^2. This impoundment is suspected to have contained contaminants similar to those presently found in the Mud Pond/ Mud Holes.

Landfill

The unlined landfill is located in an open, uncovered, partially wooded lot between the north side of Herb Hill Road and The Place. Most of the landfill is located to the northern end of the lot closest to The Place. The estimated volume of the landfill area is approximately 6,000 yds^3. The actual quantity of hazardous waste within the landfill is unknown. The specific hazardous substances suspected to present in the landfill are the residues from the tungsten ore extraction process. Buried drums of unknown structural integrity were reported to be present in the area (Ref. Nos. 4, 36, 49).

Stained Soil

Stained soil is found along the perimeter of the Mud Pond/ Mud Holes and extends under and beyond the wooden fence to the edge of Garvies Point Road. Stained soil is also found around the nine radioactive waste piles. The quantity of hazardous substances present within the stained soil is unknown. The volume of material to be removed from the Mud Pond/ Mud Holes area is estimated to be greater than 5,000 yds^3. The substances known to be present in the stained soil around the Mud Pond/Mud Holes include chloride compounds, sulfate compounds, No. 2 fuel oil, and heavy metals such as lead, chromium, cadmium, arsenic, and tungsten. The stained soil in the aforementioned area also has an organic odor.

Ref. Nos. 2, 4, 5, 8, 21, 26, 30, 31, 32, 37, 40, 41, 42, 49, 50, 52

PART III: SITE INSPECTION SAMPLE RESULTS

NUS Corporation Region 2 FIT conducted a site inspection at the Li Tungsten facility on April 18-19, 1990 and on May 15, 1990, during which a total of 9 groundwater, 13 surface water, 9 sediment, and 11 soil samples were collected. These samples were collected to determine whether any CERCLA-eligible compounds are present in the groundwater, surface water, sediment, or soil that can be attributed to the waste units present on the site. All sample locations are shown on Figure 4 of this report. These samples were analyzed under the Contract Laboratory Program (CLP) for Target Compound List (TCL) organic and inorganic compounds, including cyanide. Refer to Table 1 in Part III of this report for a summary of the significant organic and inorganic compounds that were detected on the site. All CLP analytical data sheets are provided in Reference No. 50 of this report. Eleven surface water, 8 sediment, and 10 soil samples that had been collected by NUS Corporation Region 2 FIT in April and May 1990 were received by the National Enforcement Investigations Center (NEIC) on June 18, 1990. These samples were analyzed quantitatively for tungsten and qualititatively for copper, zinc, arsenic, molybdenum, antimony, lead, bismuth, thorium, and uranium, using inductively coupled plasma mass spectrometry (ICP/MS). Analysis for tungsten is not part of the routine analytical services performed under the CLP. Refer to Reference No. 31 for a summary of the NEIC analytical results.

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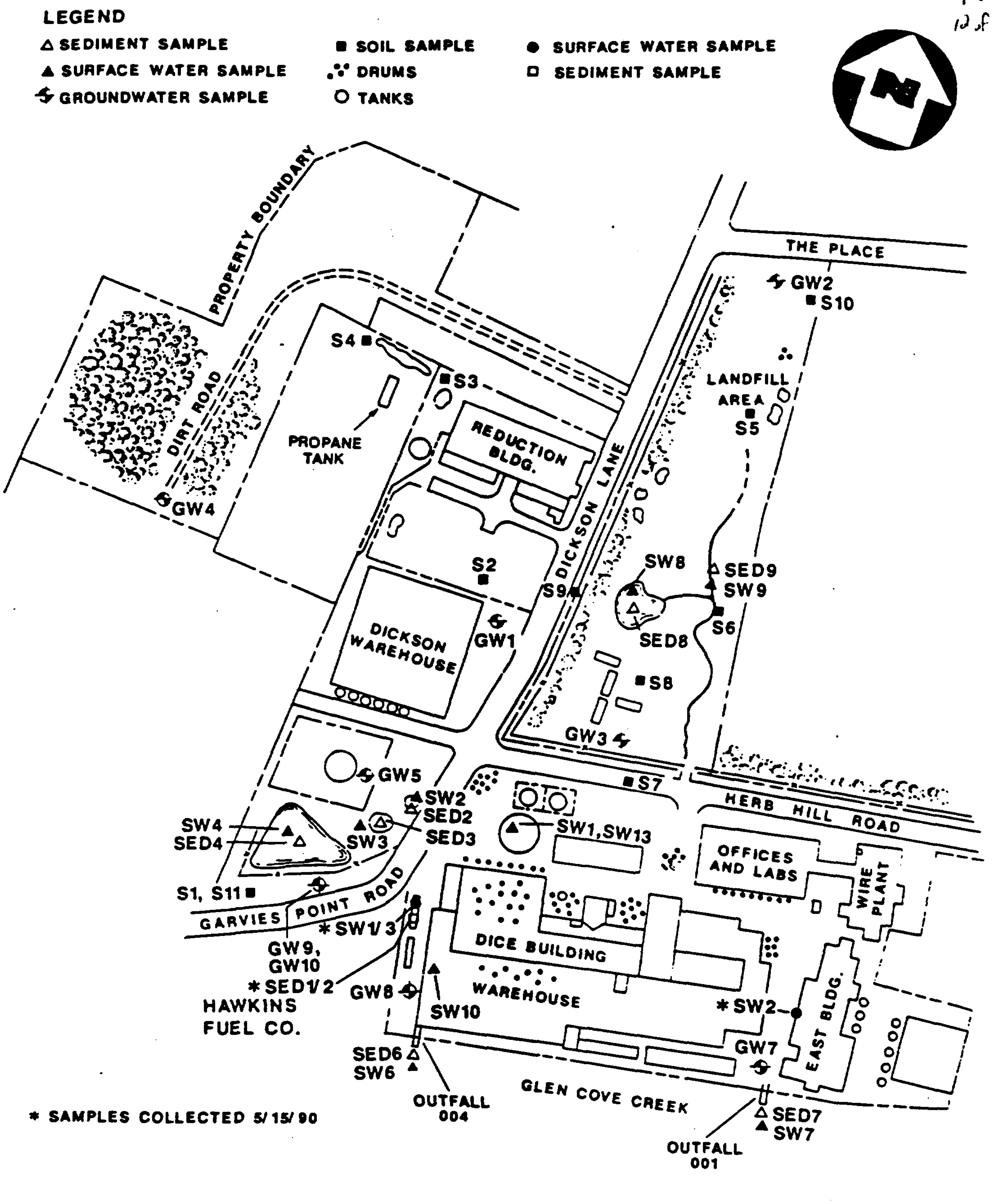

SAMPLE LOCATION MAP

LI TUNGSTEN, GLEN COVE, LONG ISLAND, N.Y.

NOT TO SCALE

FIGURE 4

NUS CORPORATION

103534

ROB: 02-9003-01
SAMPLING DATES: 04/18/90-04/19/90
EPA CASE NO.: 13706 LAB: COMPUCHEM

VOLATILES															
Sample ID No.	NYJL-GW1	NYJL-GW4	NYJL-GW5	NYJL-GW9	NYJL-GW10(DUP)	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3	NYJL-SW4	NYJL-SW6	NYJL-SW13(DUP)	NYJL-SED2	NYJL-SED3	NYJL-SED4	NYJL-SED6
Traffic Report No.	BED18	BED21	BED22	BED26	BED27	BED28	BED29	BED30	BED31	BED33	BED40	BED42	BED43	BED44	BED46
Matrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/kg	ug/kg
Dilution Factor	1	2.78	5	1	1	1	1	1	1	1	1	1	1	1	1
Percent Moisture	--	--	--	--	--	--	--	--	--	--	--	24	45	40	40
Chloromethane															
Bromomethane															
Vinyl Chloride															
Chloroethane															
Methylene Chloride															
Acetone			600												
Carbon Disulfide															
1,1-Dichloroethene		J													
1,1-Dichloroethane		J													
trans-1,2-Dichloroethene (total)		87								J					
Chloroform															
1,2-Dichloroethane															
2-Butanone			84												44 E
1,1,1-Trichloroethane		450													
Carbon Tetrachloride															
Vinyl Acetate															
Bromodichloromethane															
1,2-Dichloropropane															
cis-1,3-Dichloropropene															
Trichloroethene		93								J					J
Dibromochloromethane															
1,1,2-Trichloroethane															
Benzene															
trans-1,3-Dichloropropene															
Bromoform															
4-Methyl-2-Pentanone															
2-Hexanone															
Tetrachloroethene										14					
Toluene															
1,1,2,2-Tetrachloroethane															
Chlorobenzene															
Ethylbenzene															
Styrene															
Xylenes (Total)															

NOTES:
Blank space - compound analyzed for but not detected
B - compound found in lab blank as well as sample, indicates possible/probable blank contamination
E - estimated value
J - estimated value, compound present below CRQL but above IDL
R - Analysis did not pass EPA QA/QC
N - Presumptive evidence of the presence of the material
-- - analysis not required
[illegible]

103535

Ref. 6
13,F48

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

MPLING DATES: 04/18/90-04/19/90
A CASE NO.: 13907 LAB: COMPUCHEM

LATILES											
mple ID No.	NYJL-S1	NYJL-S2(MS/MSD)	NYJL-S3	NYJL-S4	NYJL-S9	NYJL-S11(DUP)	NYJL-RIN1	NYJL-RIN2	NYJL-RIN3	NYJL-RIN4	NYJL-TRBK1
affic Report No.	BEB50	BEB51	BEB52	BEB53	BEB58	BEB60	BEB61	BEB62	BEB63	BEB64	BEB69
trix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	WATER	WATER	WATER	WATER	WATER
its	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L	ug/L	ug/L	ug/L
lution Factor	1	1	1	1	1	1	1	1	1	1	1
rcent Moisture	27	52	19	12	12	24	--	--	--	--	--
loromethane											
omomethane											
nyl Chloride											
loroethane											
thylene Chloride											
etone											
rbon Disulfide											
1-Dichloroethene											
1-Dichloroethane											
ans-1,2-Dichloroethene (total)											
loroform											
2-Dichloroethane											
Butanone											
1,1-Trichloroethane											
rbon Tetrachloride											
nyl Acetate											
omodichloromethane											
-Dichloropropane											
-1,3-Dichloropropene											
chloroethene											
romochloromethane											
,2-Trichloroethane											
zene											
ns-1,3-Dichloropropene											
moform											
ethyl-2-Pentanone											
exanone											
rachloroethene											
uene											
,2,2-Tetrachloroethane											
orobenzene											
ylbenzene											
rene											
enes (Total)											

ES:
nk space compound analyzed for but
 not detected
 compound found in lab blank as well as
 sample, indicates possible/probable
 blank contamination
 estimated value
 estimated value, compound present
 below CRQL but above IDL
 analysis did not pass EPA QA/QC
 Presumptive evidence of the presence
 of the material
 analysis not required
 ction limits elevated if dilution

103536

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.. J.-NO. ..
AMPLING DATES: 04/18/90-04/19/90
PA CASE NO.. 12?06 LAB: COMPUCHEM

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

OLATILES																		
ample ID No.	NYJL-GW2	NYJL-GW3	NYJL-GW7	NYJL-GW8	NYJL-SW7	NYJL-SW8	NYJL-SW9	NYJL-SW10	NYJL-SED7	NYJL-SED8	NYJL-SED9	NYJL-S5	NYJL-S6	NYJL-S7	NYJL-S8	NYJL-S10	NYJL-RIN5	NYJL-RIN6
raffic Report No	BEB19	BEB20	BEB24	BEB25	BEB34	BEB35	BEB36	BEB37	BEB47	BEB48	BEB49	BEB54	BEB55	BEB56	BEB57	BEB59	BEB65	BEB66
atrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SOIL	SOIL	SOIL	SOIL	SOIL	WATER	WATER
nits	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L
ilution Factor	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ercent Moisture	--	--	--	--	--	--	--	--	56	46	93	10	23	13	18	35	--	--
hloromethane																		
romomethane																		
inyl Chloride																		
hloroethane																		
ethylene Chloride																		
cetone						15												
arbon Disulfide																		
,1-Dichloroethene																		
,1-Dichloroethane																		
ans-1,2-Dichloroethene (total)		110			J	J												
hloroform				J														J
2-Dichloroethane		--																
Butanone									J									
1,1-Trichloroethane																		
rbon Tetrachloride																		
nyl Acetate																		
omodichloromethane																		
2-Dichloropropane																		
s-1,3-Dichloropropene																		
ichloroethene		120		5	J	J												
bromochloromethane																		
1,2-Trichloroethane																		
nzene																		
ans-1,3-Dichloropropene																		
omoform																		
Methyl-2-Pentanone																		
lexanone																		
trachloroethene		1100			19	J												
luene																		
1,2,2-Tetrachloroethane																		
lorobenzene																		
hylbenzene																		
rene																		
lenes (total)																		

TES:
ank space - compound analyzed for but
 not detected
 compound found in lab blank as well as
 sample, indicates possible/probable
 blank contamination
 estimated value
 estimated value, compound present
 below CRQL but above IDL
 analysis did not pass EPA QA/QC
 Presumptive evidence of the presence
 of the material
- analysis not required
ection lim t: elevated if Dilution

103537

Rev. No. 0

Ref. 6
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AMPLING DATES: 04/18/90-04/19/90
PA CASE NO.: 13706 LAB: COMPUCHEM

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

OLATILES			
ample ID No.	NYJL-RIN7	NYJL-RIN8	NYJL-TRBK2
raffic Report No.	BEB67	BEB68	BEB70
atrix	WATER	WATER	WATER
nits	ug/L	ug/L	ug/L
ilution Factor	1	1	1
ercent Moisture	--	--	--
hloromethane			
romomethane			
inyl Chloride			
hloroethane			
ethylene Chloride			J
cetone			
rbon Disulfide			
,1-Dichloroethene			
,1-Dichloroethane			
ans-1,2-Dichloroethene (total)			
loroform			
2-Dichloroethane		--	
Butanone			
1,1-Trichloroethane			
rbon Tetrachloride			
nyl Acetate			
omodichloromethane			
2-Dichloropropane			
s-1,3-Dichloropropene			
ichloroethene			
bromochloromethane			
1,2-Trichloroethane			
nzene			
ans-1,3-Dichloropropene			
omoform			
Methyl-2-Pentanone			
Hexanone			
trachloroethene			
luene			
1,2,2-Tetrachloroethane			
lorobenzene			
hylbenzene			
yrene			
lenes (Total)			

TES:
ank space - compound analyzed for but not detected
- compound found in lab blank as well as sample, indicates possible/probable blank contamination
estimated value
estimated value, compound present below CRQL but above IDL
analysis did not pass EPA QA/QC
Presumptive evidence of the presence of the material
- analysis not required
ection limits elevated if dilution

103538

REV. NO. 0
Ref. 6
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..., 02-?(. ..
AMPLING DATES: 04/18/90-04/19/90
PA CASE NO.: 13?06 LAB: COMPUCHEM

TABLE 1

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

EMI-VOLATILES															
ample ID No.	NYJL-GW1	NYJL-GW4	NYJL-GW5	NYJL-GW7	NYJL-GW10(DUP)	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3	NYJL-SW4	NYJL-SW6	NYJL-SW13(DUP)	NYJL-SED2	NYJL-SED3	NYJL-SED4	NYJL-SED6
raffic Report No.	BEB18	BEB21	BEB22	BEB26	BEB27	BEB28	BEB29	BEB30	BEB31	BEB33	BEB40	BEB42	BEB43	BEB44	BEB46
atrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
nits	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/kg	ug/kg
ilution Factor/GPC Cleanup (Y)	1	1		1	1	1	1	1	1	1	1	1	1	.99	1
ercent Moisture		--	--	--	--	--	--	--	--	--	--	24	45	40	40
henol			LAB DID	R	R										
is(2-Chloroethyl)ether			NOT RUN	R	R										
-Chlorophenol			ANALYSIS	R	R										
.3-Dichlorobenzene			ON THIS	R	R										
.4-Dichlorobenzene			SAMPLE	R	R										
enzyl alcohol				R	R										
2-Dichlorobenzene				R	R										
Methylphenol				R	R										
s(2-Chloroisopropyl)ether				R	R										
Methylphenol				R	R										
Nitroso-di-n-dipropylamine		--		R	R										
xachloroethane				R	R										
trobenzene				R	R										
ophorone				R	R										
Nitrophenol				R	R										
4-Dimethylphenol				R	R										
nzoic acid				R	R							J	J		J
s(2-Chloroethoxy)methane				R	R										
4-Dichlorophenol				R	R										
2,4-Trichlorobenzene				R	R										
phthalene				R	R										
Chloroaniline				R	R										
xachlorobutadiene				R	R										
hloro-3-Methylphenol				R	R										
ethylnaphthalene				R	R										
achlorocyclopentadiene				R	R										
,6-Trichlorophenol				R	R										
,5-Trichlorophenol				R	R										
hloronaphthalene				R	R										
itroaniline				R	R										
ethylphthalate				R	R										
naphthylene				R	R										J
-Dinitrotoluene				R	R										
itroaniline				R	R										
naphthene				R	R										J
-Dinitrophenol				R	R										
itrophenol				R	R								J		
enzofuran				R	R										
-Dinitrotoluene				R	R										
thylphthalate				R	R										
hlorophenyl-phenyl ether				R	R										J
orene				R	R										
itroaniline				R	R										
Dinitro-2-methylphenol				R	R										
itrosodiphenylamine				R	R										
omophenyl-phenyl ether				R	R										
achlorobenzene				R	R										

103539

Rev. No. 0

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17.f43

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

TDD#: 02-9003-91
SAMPLING DATES: 04/18/90-04/19/90
EPA CASE NO.: 13?06 LAB: COMPUCHEM

SEMI-VOLATILES															
Sample ID No.	NYJL-GW1	NYJL-GW4	NYJL-GW5	NYJL-GW9	NYJL-GW10(DUP)	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3	NYJL-SW4	NYJL-SW6	NYJL-SW13(DUP)	NYJL-SED2	NYJL-SED3	NYJL-SED4	NYJL-SED6
Traffic Report No.	BEB18	BEB21	BEB22	BEB26	BEB27	BEB28	BEB29	BEB30	BEB31	BEB33	BEB40	BEB42	BEB43	BEB44	BEB46
Matrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/kg	ug/kg	ug/kg	ug/kg
Dilution Factor/GPC Cleanup (Y)	1	1		1	1	1	1	1	1	1	1	1	1	.99	1
Percent Moisture		--	--	--	--	--	--	--	--	--	--	24	45	40	40
Pentachlorophenol				R	R										
Phenanthrene				R	R										J
Anthracene				R	R										J
Di-n-butylphthalate				R	R										J
Fluoranthene				R	R										1600
Pyrene				R	R									J	1200
Butylbenzylphthalate				R	R										J
3,3'-Dichlorobenzidine				R	R										
Benzo(a)anthracene				R	R							JN			810
Chrysene				R	R							JN			870
bis(2-Ethylhexyl)phthalate		--		R	R									580	3000
Di-n-octylphthalate				R	R										J
Benzo(b)fluoranthene				R	R							JN	JN	JN	2000 EN
Benzo(k)fluoranthene				R	R							JN	JN	JN	2000 EN
Benzo(a)pyrene				R	R										760
Indeno(1,2,3-cd)pyrene				R	R										J
Dibenz(a,h)anthracene				R	R										J
Benzo(g,h,i)perylene				R	R										J

NOTES:
Blank space - compound analyzed for but not detected
- compound found in lab blank as well as sample, indicates possible/probable blank contamination
- estimated value
- estimated value, compound present below CRQL but above IDL
- analysis did not pass EPA QA/QC
- Presumptive evidence of the presence of the material
- analysis not required
Detection limits elevated if Dilution Factor >1 and/or percent moisture >0%

103540

Ref. No. 6
13,143

EPA CASE NO.: 15709 LAB: COMPUCHEM

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

SEMI-VOLATILES											
Sample ID No.	NYJL-S1	NYJL-S2(MS/MSD)	NYJL-S3	NYJL-S4	NYJL-S7	NYJL-S11(DUP)	NYJL-RIN1	NYJL-RIN2	NYJL-RIN3	NYJL-RIN4	NYJL-TABK1
Traffic Report No	BEB50	BEB51	BEB52	BEB53	BEB58	BEB60	BEB61	BEB62	BEB63	BEB64	BEB69
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	WATER	WATER	WATER	WATER	WATER
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/l	ug/l	ug/l	ug/l	ug/L
Dilution Factor/GPC Cleanup (Y)	1	.99	1	1	1	1	1	1	1	1	N/A
Percent Moisture	27	52	18	13	12	24	--	--	--	--	N/A
Phenol											NR
bis(2-Chloroethyl)ether											NR
2-Chlorophenol											NR
1,3-Dichlorobenzene											NR
1,4-Dichlorobenzene											NR
Benzyl alcohol											NR
1,2-Dichlorobenzene											NR
2-Methylphenol											NR
bis(2-Chloroisopropyl)ether											NR
4-Methylphenol											NR
N-Nitroso-di-n-dipropylamine											NR
Hexachloroethane											NR
Nitrobenzene											NR
Isophorone											NR
2-Nitrophenol											NR
2,4-Dimethylphenol											NR
Benzoic acid		J	J		J	J					NR
bis(2-Chloroethoxy)methane											NR
2,4-Dichlorophenol											NR
1,2,4-Trichlorobenzene											NR
Naphthalene											NR
4-Chloroaniline											NR
Hexachlorobutadiene											NR
4-Chloro-3-Methylphenol											NR
2-Methylnaphthalene											NR
Hexachlorocyclopentadiene											NR
2,4,6-Trichlorophenol											NR
2,4,5-Trichlorophenol											NR
2-Chloronaphthalene											NR
2-Nitroaniline											NR
Dimethylphthalate											NR
Acenaphthylene											NR
2,6-Dinitrotoluene											NR
3-Nitroaniline											NR
Acenaphthene											NR
2,4-Dinitrophenol											NR
4-Nitrophenol											NR
Dibenzofuran											NR
2,4-Dinitrotoluene											NR
Diethylphthalate											NR
4-Chlorophenyl-phenyl ether											NR
Fluorene											NR
4-Nitroaniline											NR
4,6-Dinitro-2-methylphenol											NR
N-nitrosodiphenylamine											NR
4-Bromophenyl-phenyl ether											NR
Hexachlorobenzene											NR

103541

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SAMPLING DATES: 04/18/90-04/19/90
EPA CASE NO.: 13707 LAB: COMPUCHEM

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

SEMI-VOLATILES											
Sample ID No.	NYJL-S1	NYJL-S2(MS/MSD)	NYJL-S3	NYJL-S4	NYJL-S9	NYJL-S11(DUP)	NYJL-RIN1	NYJL-RIN2	NYJL-RIN3	NYJL-RIN4	NYJL-TRBK1
Traffic Report No.	BEB50	BEB51	BEB52	BEB53	BEB58	BEB60	BEB61	BEB62	BEB63	BEB64	BEB69
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	WATER	WATER	WATER	WATER	WATER
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor/GPC Cleanup (Y)	1	.99	1	1	1	1	1	1	1	1	N/A
Percent Moisture	27	52	18	13	12	24	--	--	--	--	N/A
Pentachlorophenol											NR
Phenanthrene					J	J					NR
Anthracene					J						NR
Di-n-butylphthalate		J	690								NR
Fluoranthene	J				610	J					NR
Pyrene					630	J					NR
Butylbenzylphthalate											NR
3,3'-Dichlorobenzidine											NR
Benzo(a)anthracene					410	J					NR
Chrysene					390	J					NR
bis(2-Ethylhexyl)phthalate	J	J	J			J					NR
Di-n-octylphthalate											NR
Benzo(b)fluoranthene	JN	JN			980 EN	460 EN					NR
Benzo(k)fluoranthene	JN	JN			980 EN	460 EN					NR
Benzo(a)pyrene					440	J					NR
Indeno(1,2,3-cd)pyrene					J	J					NR
Dibenz(a,h)anthracene					J						NR
Benzo(g,h,i)perylene					380	J					NR

NOTES:
Blank space - compound analyzed for but not detected
B - compound found in lab blank as well as sample, indicates possible/probable blank contamination
E - estimated value
J - estimated value, compound present below CRQL but above IDL
R - analysis did not pass EPA QA/QC
N - Presumptive evidence of the presence of the material
NR - analysis not required
Detection limits elevated if Dilution Factor >1 and/or percent moisture >0%

103542

Rev. No. 0

Ref. 6
20 of 48

SAMPLING DATES: 04/18/90-04/19/90
EPA CASE NO.: 13706 LAB: COMPUCHEM

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

SEMI-VOLATILES																		
Sample ID No.	NYJL-GW2	NYJL-GW3	NYJL-GW7	NYJL-GW8	NYJL-SW7	NYJL-SW8	NYJL-SW9	NYJL-SW10	NYJL-SED7	NYJL-SED8	NYJL-SED9	NYJL-S5	NYJL-S6	NYJL-S7	NYJL-S8	NYJL-S10	NYJL-RIN5	NYJL-RIN6
Traffic Report No.	BEB19	BEB20	BEB24	BEB25	BEB34	BEB35	BEB36	BEB37	BEB47	BEB48	BEB49	BEB54	BEB55	BEB56	BEB57	BEB59	BEB65	BEB66
Matrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SOIL	SOIL	SOIL	SOIL	SOIL	WATER	WATER
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L
Dilution Factor/GPC Cleanup (Y)	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1
Percent Moisture	--	--	--	--	--	--	--	--	56	46	83	18	23	13	18	35	--	--
Phenol		R				R	R		J									
bis(2-Chloroethyl)ether																		
2-Chlorophenol		R				R	R											
1,3-Dichlorobenzene																		
1,4-Dichlorobenzene																		
Benzyl alcohol																		
1,2-Dichlorobenzene																		
2-Methylphenol		R				R	R											
bis(2-Chloroisopropyl)ether																		
4-Methylphenol		R				R	R											
N-Nitroso-di-n-dipropylamine																		
Hexachloroethane																		
Nitrobenzene																		
Isophorone																		
2-Nitrophenol		R				R	R											
2,4-Dimethylphenol		R				R	R											
Benzoic acid		R				R	R	J	J							J		
bis(2-Chloroethoxy)methane																		
2,4-Dichlorophenol		R				R	R											
1,2,4-Trichlorobenzene												J						
Naphthalene														J				
4-Chloroaniline																		
Hexachlorobutadiene																		
4-Chloro-3-Methylphenol		R			J	R	R											
2-Methylnaphthalene																		
Hexachlorocyclopentadiene																		
2,4,6-Trichlorophenol		R				R	R											
2,4,5-Trichlorophenol		R				R	R											
2-Chloronaphthalene																		
2-Nitroaniline																		
Dimethylphthalate																		
Acenaphthylene																		
2,6-Dinitrotoluene																		
3-Nitroaniline																		
Acenaphthene									J					J				
2,4-Dinitrophenol		R				R	R											
4-Nitrophenol		R				R	R											
Dibenzofuran									J					J				
2,4-Dinitrotoluene																		
Diethylphthalate																		
4-Chlorophenyl-phenyl ether																		
Fluorene									J					J				
4-Nitroaniline																		
4,6-Dinitro-2-methylphenol		R				R	R											
N-nitrosodiphenylamine																		
4-Bromophenyl-phenyl ether																		
Hexachlorobenzene																		

103543

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SAMPLING DATES: 04/18/90-04/19/90
EPA CASE NO.: 13906 LAB: COMPUCHEM

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

SEMI-VOLATILES																		
Sample ID No.	NYJL-GW2	NYJL-GW3	NYJL-GW7	NYJL-GW8	NYJL-SW7	NYJL-SW8	NYJL-SW9	NYJL-SW10	NYJL-SED7	NYJL-SED8	NYJL-SED9	NYJL-S5	NYJL-S6	NYJL-S7	NYJL-S8	NYJL-S10	NYJL-RIN5	NYJL-RIN6
Traffic Report No	BEB19	BEB20	BEB24	BEB25	BEB34	BEB35	BEB36	BEB37	BEB47	BEB48	BEB49	BEB54	BEB55	BEB56	BEB57	BEB59	BEB65	BEB66
Matrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SOIL	SOIL	SOIL	SOIL	SOIL	WATER	WATER
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L
Dilution Factor/GPC Cleanup (Y)	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1
Percent Moisture	--	--	--	--	--	--	--	--	56	46	83	18	23	13	18	35	--	--
Pentachlorophenol		R				R	R											
Phenanthrene									2700			J	J	890		J		
Anthracene									J					J				
Di-n-butylphthalate									J							J		
Fluoranthene									6800			J	J	990		J		
Pyrene									3900			J	J	950		J		
Butylbenzylphthalate									J					J		J		
3,3'-Dichlorobenzidine																		
Benzo(a)anthracene									2400				J	560		J		
Chrysene									3000			J	J	540		J		
bis(2-Ethylhexyl)phthalate									7200			J	J	J	J	J		
Di-n-octylphthalate									J									
Benzo(b)fluoranthene									3600			JN	JN	730 EN		JN		
Benzo(k)fluoranthene									2500			JN	JN	930 EN		JN		
Benzo(a)pyrene									2500			J	J	420		J		
Indeno(1,2,3-cd)pyrene									J				J	J		J		
Dibenz(a,h)anthracene									J					J				
Benzo(g,h,i)perylene									J				J	J		J		

NOTES:
Blank space - compound analyzed for but not detected
B - compound found in lab blank as well as sample, indicates possible/probable blank contamination
E - estimated value
J - estimated value, compound present below CRQL but above IDL
R - analysis did not pass EPA QA/QC
N - Presumptive evidence of the presence of the material
NR - analysis not required
Detection limits elevated if Dilution Factor >1 and/or percent moisture >0%

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SAMPLING DATES: 04/18/90-04/19/90
PA CASE NO.: 13706 LAB: COMPUCHEM

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

EMI-VOLATILES			
ample ID No.	NYJL-RIN7	NYJL-RIN8	NYJL-TRBK2
raffic Record No.	BEB67	BEB68	BEB70
latrix	WATER	WATER	WATER
nits	ug/L	ug/L	ug/L
ilution Factor/GPC Cleanup (Y)	1	1	N/A
ercent Moisture	--	--	N/A
henol			NR
is(2-Chloroethyl)ether			NR
-Chlorophenol			NR
,3-Dichlorobenzene			NR
,4-Dichlorobenzene			NR
enzyl alcohol			NR
,2-Dichlorobenzene			NR
-Methylphenol			NR
is(2-Chloroisopropyl)ether			NR
-Methylphenol			NR
-Nitroso-di-n-dipropylamine			NR
exachloroethane			NR
itrobenzene			NR
sophorone			NR
-Nitrophenol			NR
,4-Dimethylphenol			NR
enzoic acid			NR
is(2-Chloroethoxy)methane			NR
,4-Dichlorophenol			NR
,2,4-Trichlorobenzene			NR
aphthalene			NR
-Chloroaniline			NR
exachlorobutadiene			NR
Chloro-3-Methylphenol			NR
Methylnaphthalene			NR
exachlorocyclopentadiene			NR
4,6-Trichlorophenol			NR
4,5-Trichlorophenol			NR
Chloronaphthalene			NR
Nitroaniline			NR
methylphthalate			NR
enaphthylene			NR
6-Dinitrotoluene			NR
Nitroaniline			NR
enaphthene			NR
4-Dinitrophenol			NR
Nitrophenol			NR
benzofuran			NR
4-Dinitrotoluene			NR
ethylphthalate			NR
Chlorophenyl-phenyl ether			NR
uorene			NR
Nitroaniline			NR
6-Dinitro-2-methylphenol			NR
nitrosodiphenylamine			NR
Bromophenyl-phenyl ether			NR
xachlorobenzene			NR

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SAMPLING DATES: 04/18/90-04/19/90
EPA CASE NO.: 13906 LAB: COMPUCHEM

SUMMARY OF SITE INSPECTION ANALYTICAL DATA (cont'd)

SEMI-VOLATILES			
Sample ID No.	NYJL-RIN7	NYJL-RIN8	NYJL-TRBF2
Traffic Report No.	BEB67	BEB68	BEB70
Matrix	WATER	WATER	WATER
Units	ug/L	ug/L	ug/L
Dilution Factor/GPC Cleanup (Y)	1	1	N/A
Percent Moisture	--	--	N/A
Pentachlorophenol			NR
Phenanthrene			NR
Anthracene			NR
Di-n-butylphthalate			NR
Fluoranthene			NR
Pyrene			NR
Butylbenzylphthalate			NR
3,3'-Dichlorobenzidine			NR
Benzo(a)anthracene			NR
Chrysene			NR
bis(2-Ethylhexyl)phthalate			NR
Di-n-octylphthalate		--	NR
Benzo(b)fluoranthene			NR
Benzo(k)fluoranthene			NR
Benzo(a)pyrene			NR
Indeno(1,2,3-cd)pyrene			NR
Dibenz(a,h)anthracene			NR
Benzo(g,h,i)perylene			NR

NOTES:
Blank space - compound analyzed for but not detected
- compound found in lab blank as well as sample, indicates possible/probable blank contamination
- estimated value
- estimated value, compound present below CRQL but above IDL
- analysis did not pass EPA QA/QC
- Presumptive evidence of the presence of the material
NR - analysis not required
Detection limits elevated if Dilution Factor >1 and/or percent moisture >0%

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TABLE 1

PLING DATES: 04/18/90-04/19/90
CASE NO. 13706 LAB: COMPUCHEM

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

STICIDES															
ple ID No.	NYJL-GW1	NYJL-GW4	NYJL-GW5	NYJL-GW9	NYJL-GW10(DUP)	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3	NYJL-SW4	NYJL-SW6	NYJL-SW13(DUP)	NYJL-SED2	NYJL-SED3	NYJL-SED4	NYJL-SED6
ffic Report No.	BED18	BED21	BED22	BED26	BED27	BED28	BED29	BED30	BED31	BED33	BED40	BED42	BED43	BED44	BED46
rix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
ts	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/kg	ug/kg
ution Factor/GPC Cleanup (Y)	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1
cent Moisture		--	--	--	--	--	--	--	--	--	--	24	45	40	40
ha-BHC			R												R
a-BHC			R												R
ta-BHC			R												R
ma-BHC (Lindane)			R												R
tachlor			R												R
rin			R												R
tachlor epoxide			R												
osulfan I			R												
ldrin															
'-DDE															
rin															
osulfan II															
'-DDD															
osulfan sulfate															
'-DDT															
hoxychlor															
rin ketone															
ha-Chlordane															
ma-Chlordane															
aphene															
lor-1016															
lor-1221															
lor-1232															
lor-1242															
lor-1248								2.6				9600	50000	610	
lor-1254						2		1.4			2.2	1600			
lor-1260															

S:
k space - compound analyzed for but not detected
compound found in lab blank as well as sample, indicates possible/probable blank contamination
estimated value
estimated value, compound present below CRQL but above IDL
analysis did not pass EPA QA/QC
Presumptive evidence of the presence of the material
analysis not required
ction limits elevated if Dilution or >1 and/or percent moisture >0%

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TDD#: 02-9003-01
SAMPLING DATES: 04/18/90-04/19/90
EPA CASE NO.: 13909 LAB: COMPUCHEM

SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

PESTICIDES											
Sample ID No.	NYJL-S1	NYJL-S2(MS/MSD)	NYJL-S3	NYJL-S4	NYJL-S9	NYJL-S11(DUP)	NYJL-RIN1	NYJL-RIN2	NYJL-RIN3	NYJL-RIN4	NYJL-TRBK1
Traffic Report No.	BEB50	BEB51	BEB52	BEB53	BEB58	BEB60	BEB61	BEB62	BEB63	BEB64	BEB69
Matrix	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	WATER	WATER	WATER	WATER	WATER
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor/GPC Cleanup (Y)	1	1	1	1	1	1	1	1	1	1	N/A
Percent Moisture	27	52	18	13	12	24	--	--	--	--	N/A
alpha-BHC			R								NR
beta-BHC			R								NR
delta-BHC			R								NR
gamma-BHC (Lindane)			R								NR
Heptachlor			R								NR
Aldrin			R								NR
Heptachlor epoxide			R								NR
Endosulfan I			R								NR
Dieldrin											NR
4,4'-DDE	34										NR
Endrin											NR
Endosulfan II											NR
4,4'-DDD											NR
Endosulfan sulfate											NR
4,4'-DDT	60					57					NR
Methoxychlor											NR
Endrin ketone											NR
alpha-Chlordane											NR
gamma-Chlordane											NR
Toxaphene											NR
Aroclor-1016											NR
Aroclor-1221											NR
Aroclor-1232											NR
Aroclor-1242											NR
Aroclor-1248					4700						NR
Aroclor-1254					2900						NR
Aroclor-1260											NR

NOTES:
Blank space - compound analyzed for but not detected
B - compound found in lab blank as well as sample, indicates possible/probable blank contamination
- estimated value
J - estimated value, compound present below CRQL but above IDL
R - analysis did not pass EPA QA/QC
- Presumptive evidence of the presence of the material
NR - analysis not required
Detection limits elevated if Dilution Factor >1 and/or percent moisture >0%

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#: 02-9003-01
PLING DATES: 04/18/90-04/19/90
CASE NO : 13706 LAB: COMPUCHEM

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

TICIDES																		
ple ID No.	NYJL-GW2	NYJL-GW3	NYJL-GW7	NYJL-GW8	NYJL-SW7	NYJL-SW8	NYJL-SW9	NYJL-SW10	NYJL-SED7	NYJL-SED8	NYJL-SED9	NYJL-S5	NYJL-S6	NYJL-S7	NYJL-S8	NYJL-S10	NYJL-RIN5	NYJL-RIN6
ffic Report No.	BEB19	BEB20	BEB24	BEB25	BEB34	BEB35	BEB36	BEB37	BEB47	BEB48	BEB49	BEB54	BEB55	BEB56	BEB57	BEB59	BEB65	BEB66
rix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SOIL	SOIL	SOIL	SOIL	SOIL	WATER	WATER
ts	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L
ution Factor/GPC Cleanup (Y)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
cent Moisture	--	--	--	--	--	--	--	--	56	46	83	18	23	13	18	35	--	--
ha-BHC																		
a-BHC																		
ta-BHC																		
ma-BHC (Lindane)																		
tachlor																		
rin																		
tachlor epoxide											67 E							
osulfan I																		
ldrin																		
'-DDE										170								
rin																		
osulfan II																		
'-DDD						0.17			79	150								
osulfan sulfate																		
'-DDT													71					
oxychlor																		
in ketone																		
a-Chlordane																		
a-Chlordane																		
phene																		
lor-1016																		
lor-1221																		
lor-1232																		
lor-1242																		
lor-1248																		
lor-1254												540		640		690		
lor-1260																		

S:
k space - compound analyzed for but not detected
compound found in lab blank as well as sample, indicates possible/probable blank contamination
estimated value
estimated value, compound present below CRQL but above IDL
analysis did not pass EPA QA/QC
Presumptive evidence of the presence of the material
analysis not required
ction limits elevated if Dilution or >1 and/or percent moisture >0%

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TDD#: 02-9003-01
SAMPLING DATES: 04/18/90-04/19/90
EPA CASE NO.: 13906 LAB: COMPUCHEM

SUMMARY OF SITE INSPECTION ANALYTICAL DATA (cont'd)

PESTICIDES			
Sample ID No.	NYJL-RIN7	NYJL-RIN8	NYJL-TRBK2
Traffic Report No.	BEB67	BEB68	BEB70
Matrix	WATER	WATER	WATER
Units	ug/L	ug/L	ug/L
Dilution Factor/GPC Cleanup (Y)	1	1	N/A
Percent Moisture	--	--	N/A
alpha-BHC			NR
beta-BHC			NR
delta-BHC			NR
gamma-BHC (Lindane)			NR
Heptachlor			NR
Aldrin			NR
Heptachlor epoxide			NR
Endosulfan I			NR
Dieldrin			NR
4,4'-DDE			NR
Endrin			NR
Endosulfan II			NR
4,4'-DDD			NR
Endosulfan sulfate			NR
4,4'-DDT			NR
Methoxychlor			NR
Endrin ketone			NR
alpha-Chlordane			NR
gamma-Chlordane			NR
Toxaphene			NR
Aroclor-1016			NR
Aroclor-1221			NR
Aroclor-1232			NR
Aroclor-1242			NR
Aroclor-1248			NR
Aroclor-1254			NR
Aroclor-1260			NR

NOTES:
Blank space - compound analyzed for but not detected
B - compound found in lab blank as well as sample, indicates possible/probable blank contamination
E - estimated value
J - estimated value, compound present below CRQL but above IDL
R - analysis did not pass EPA QA/QC
N - Presumptive evidence of the presence of the material
NR - analysis not required
Detection limits elevated if Dilution Factor 1 and/or percent moisture 0%

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103550

TE NAME: LI TUNGSTEN
DI: 02-9003-01
MPLING DATES: 04/18/90-04/19/90
A CASE NO.: 13906
B NAME: ENSECO/RMAL

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

ORGANICS

mple ID No.	NYJL-GW1	NYJL-GW4	NYJL-GW5	NYJL-GW9	NYJL-GW10(DUP)	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3	NYJL-SW4	NYJL-SW6	NYJL-SW13(DUP)	NYJL-SED2	NYJL-SED3	NYJL-SED4	NYJL-SED6
affic Report No.	MBCJ01	MBCJ04	MBCJ05	MBCJ09	MBCJ10	MBCJ11	MBCJ12	MBCJ13	MBCJ14	MBCJ16	MBCJ23	MBCJ25	MBCJ26	MBCJ27	MBCJ29
trix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
its	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/kg	mg/kg	mg/kg	mg/kg
uminum	32600	171000		122000	120000	J	409	931	204	J	J	2190	3560	12600	6000 E
timony	68.8		3390	184	212		73.1	212				3320 E	3290 E	245 E	
senic		J	R	2690	2800	J	50.2	145 E	15.2		J	1240	1770	228	20.1 E
rium	525	707	J	J	J	J	J	J	J	J	J	333	387	131	J
ryllium	J	11.1		11.2	12.3									2.8	J
dmium												5.6	10.1	5.9	8.3 E
lcium	26100	28000	214000	541000	572000	6560	6670	40600	449000	71200	6930	2800	24000	149000	6640 E
romium	97.9	344	J	137	132		J	J				24.5	78.7	62	34.5 E
balt	128	221		353	358		61.2	475	85.8	J		18.1	60.8	1390	53.6 E
pper	171 E	276 E	J	231 E	212 E	J	103 E	640 E	48.2 E	J	26.4	171 E	454 E	994 E	281 E
on	228000	257000	6390	370000	384000	174	2150	4530	547	871	141	46400	145000	20900	19200 E
ad	31.1	209	R	144 E	88.6 E	J	141	195	102 E	J	J	2950	5140	937	254 E
gnesium	17900	46300	J	179000	187000	J	J	J	15900	175000	J	J	J	24100	4240 E
nganese	3990	7620	1730	35300	37300	J	100	535	138	173	J	221	260	1110	245 E
rcury	0.42	13	0.48	0.28	0.25		0.21	0.66				4.4 E	9 E	0.71 E	0.45 E
ckel	135	213		339	336	J	50	140	J	J	J			291	82.3 E
tassium	10100 E	14100 E	J	25400 E	25600 E	J	J	J	5920 E	47000 E	J	J	3430	3510	J
lenium									J			J	19 E		
lver						J	15	23.6	J			103	136	32.2	33.8 E
dium	10600	9940	13100000	1390000	1460000	36100	14100	56300	21700	1360000	36700		J		5150 E
llium												R	R	R	R
nadium	125	512		198	181									56.5 E	28.8 E
nc	508 E	825 E	J	5940 E	6200 E	20.7 E	93.3 E	229 E	31.4 E	J	R	119 E	197 E	551 E	1720 E
anide		13.6													

ES:
nk space - compound analyzed for but
not detected
estimated value
estimated value, compound present
below CRDL but above IDL
analysis did not pass EPA QA/QC
- analysis not required

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SITE NAME: LI TUNGSTEN
TDD#: 02-9003-01
SAMPLING DATES: 04/18/90-04/19/90
EPA CASE NO.: 13906
LAB NAME: ENSECO/RMAL

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

INORGANICS Sample ID No. Traffic Report No. Matrix Units	NYJL-S1 MBCJ33 SOIL mg/kg	NYJL-S2(MS/MSD) MBCJ34 SOIL mg/kg	NYJL-S3 MBCJ35 SOIL mg/kg	NYJL-S4 MBCJ36 SOIL mg/kg	NYJL-S9 MBCJ41 SOIL mg/kg	NYJL-S11(DUP) MBCJ43 SOIL mg/kg	NYJL-RIN1 MBCJ44 WATER ug/L	NYJL-RIN2 MBCJ45 WATER ug/L	NYJL-RIN3 MBCJ46 WATER ug/L	NYJL-RIN4 MBCJ47 WATER ug/L	NYJL-TRBK1 N/A N/A ug/L
Aluminum	6150	32300 E	330	519	4960	5550					NR
Antimony	258 E	272 E	796 E	188 E	296 E	189 E					NR
Arsenic	309	2600 E	3370	3700	233	413					NR
Barium	J	492 E	J	J	177	J					NR
Beryllium	J	8.9 E			J						NR
Cadmium	J	49 E	14.9	16	9.1	1.5					NR
Calcium	J	59200 E	J	J	2200	J					NR
Chromium	14.3	172 E		39.1	20.5	14					NR
Cobalt	J	198 E	J	J	73.5	J					NR
Copper	46.2 E	3020 E	2190 E	752 E	1150 E	46.5 E			J	J	NR
Iron	28500	172000 E	327000	246000	60100	31600	J	J	J		NR
Lead	179	16000 E	9090	1960	8660	188					NR
Magnesium	J	2470 E	J	J	1540	J					NR
Manganese	87.3	25100 E	2260	5290	2120	85.4					NR
Mercury	0.54 E	13 E	0.68 E	0.6 E	1.4 E	0.37 E					NR
Nickel	J	53.9 E			165	J					NR
Potassium	J	J	J	J	J	J					NR
Selenium			2.5 E	3.4 E	10 E						NR
Silver	4.8	65.5 E	156	84.3	55.5	5.5					NR
Sodium			8540			J					NR
Thallium	R	R	R	R	R	R					NR
Vanadium	20.8 E	117 E	J	J	22.7 E	20.3 E					NR
Zinc	43.3 E	2980 E	1330 E	1240 E	559 E	39.7 E				J	NR
Cyanide		1.5 E									NR

NOTES:
Blank space - compound analyzed for but
not detected
E - estimated value
J - estimated value, compound present
below CRDL but above IDL
R - analysis did not pass EPA QA/QC
NR - analysis not required

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ITE NAME: LI TUNGSTEN
DD#: 02-9003-01
AMPLING DATES: 04/18/90-04/19/90
PA CASE NO.: 13906
AB NAME: ENSECO/RMAL

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

NORGANICS												
ample ID No.	NYJL-GW2	NYJL-GW3	NYJL-GW7	NYJL-GW8	NYJL-SW7	NYJL-SW8	NYJL-SW9	NYJL-SW10	NYJL-SED7	NYJL-SED8	NYJL-SED9	NYJL-SS
raffic Report No.	MBCJ02	MBCJ03	MBCJ07	MBCJ08	MBCJ17	MBCJ18	MBCJ19	MBCJ20	MBCJ30	MBCJ31	MBCJ32	MBCJ37
atrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	SEDIMENT	SEDIMENT	SEDIMENT	SOIL
nits	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/kg	mg/kg	mg/kg	mg/kg
luminum	152000	115000	3970	3910	J	581	338	J	9200 E	7570	5540 E	16300
ntimony	J		276	J		86.2		877			104 E	316 E
rsenic	J	J	81.7	31.8		43.8	17.2	J	17.1 E	45.9	193 E	437
arium	963	894	J	J	J	J	J	J	J	196	1340 E	860
eryllium	11	9.4							J	J	J	2
admium	53.6	14 E	29.1			7.5 E		15.2 E	R		J	16.5
alcium	39900	88100	90600	130000	32400	53500	37700	37500	19900 E	J	13200 E	36800
hromium	369	271	23.7	20.9				66.2	47.4 E	20.4	87.6 E	160
obalt	115	109	703	52.9		2020	805	17500	30 E	92.1	7910 E	2270
opper	231 E	2080 E	391 E	60.8 E	J	167 E	55.9 E	1570	268 E	26.1 E	571 E	4180 E
ron	246000	231000	9450	34200	663	17300	24200	6580	21000 E	22800	239000 E	85900
ead	146	121	198	7.3		30.8	13.2 E	153	345 E	31.5 E	356 E	3390
agnesium	57200	42500	13000	19300	29000	14700	12700	18600 E	7990 E	1990	J	48900
anganese	3900	8190	1480	829	93.5	2280	7200	29500	212 E	205	65100 E	18400
ercury	0.25		0.87	0.29				0.84	0.53 E			1.7 E
ickel	243	225	525	50		1700	369	76900	48.3 E	44.4	3320 E	9130
otassium	34100 E	11400 E	8720 E	9380 E	9290 E	8970 E	J	7633	J	J	J	J
eldnium			J									1.9 E
lver			J					34.6	37.6 E		23.6 E	75.6
odium	23300	45500	117000	35900	202000	69800	21300	464000	13500 E			4460
hallium									R	R	R	R
anadium	421	320	J	J		J			37.7 E	32.9 E	J	43.3 E
nc	632 E	1820 E	3840 E	160 E	J	1530 E	81.4 E	P	390 E	96.9 E	622 E	1570 E
anide		11.4										

TES:
ank space - compound analyzed for but not detected
- estimated value
- estimated value, compound present below CRDL but above IDL
- analysis did not pass EPA QA/QC
- analysis not required

103553

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:ITE NAME: LI TUNGSTEN
'DD#: 02-9003-01
;AMPLING DATES: 04/18/90-04/19/90
:PA CASE NO.: 13906
AB NAME: EPSECO/RMAL

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

:NORGANICS ;ample ID No. raffic Report No. latrix Inits	NYJL-S6 MBCJ39 SOIL mg/kg	NYJL-S7 MBCJ39 SOIL mg/kg	NYJL-S8 MBCJ40 SOIL mg/kg	NYJL-S10 MBCJ42 SOIL mg/kg	NYJL-RIN5 MBCJ48 WATER ug/L	NYJL-RIN6 MBCJ49 WATER ug/L	NYJL-RIN7 MBCJ50 WATER ug/L	NYJL-RIN8 MBCJ51 WATER ug/L	NYJL-TRBK2 N/A N/A ug/L
luminum	2710	8750	9840	11200		J			NR
ntimony	458 E	17.7							NR
rsenic	452	44.1	33	10.5					NR
arium	83.1	66.7	107	95.2					NR
eryllium	J	J	J	J					NR
admium	17.4	2	1.4	1.7				31.6	NR
alcium	4770	14700	J	4580					NR
hromium	13.3	19.3	24.2	23.6					NR
obalt	J	21.4	J	16					NR
opper	1030 E	172 E	317 E	42.1 E	J		J		NR
ron	48700	14700	60200	17200	J	J	122	J	NR
ead	14200	324	58	240					NR
agnesium	J	8950	1230	2130					NR
anganese	154	403	340	760					NR
ercury	0.9 E	1.1 E		0.36 E					NR
ickel	J	29.5	9.8	25.4				J	NR
otassium	J	J	J	J					NR
elenium	13.6 E								NR
ilver	125	2.6							NR
odium									NR
hallium	R	R	R	R					NR
anadium	39.5 E	32.4 E	39.2 E	50.4 E					NR
inc	847 E	166 E	52.6 E	179 E	J	J	J	J	NR
yanide									NR

)TES:
lank space - compound analyzed for but
not detected
- estimated value
- estimated value, compound present
below CRDL but above IDL
- analysis did not pass EPA QA/QC
- analysis not required

103554

Rev. No. 0

ILT, G
32198

luu#: u2-9005-u1
SAMPLING DATE: 5/15/90
EPA CASE NO.: 14115 LAB: NET MID-ATLANTIC

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

/OLATILES										
Sample ID No.	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3(DUP)	NYJL-SED1(MS/MSD)	NYJL-SED2(DUP)	NYJL-RIN1	NYJL-RIN2	NYJL-RIN3	NYJL-RIN4	NYJL-TBLK1
Traffic Report No.	BDK63	BDK64	BDK65	BDK66	BDK67	BDK68	BDK69	BDK72	BDK73	BDP03
Matrix	WATER	WATER	WATER	SEDIMENT	SEDIMENT	WATER	WATER	WATER	WATER	WATER
Units	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor	1	1	1	1	1	1	1	1	1	1
Percent Moisture	--	--	--	44	45	--	--	--	--	--
Chloromethane										
Bromomethane										
Vinyl Chloride										
Chloroethane										
Methylene Chloride				J						
Acetone										
Carbon Disulfide										
,1-Dichloroethene										
,1-Dichloroethane										
trans-1,2-Dichloroethene (total)										
Chloroform										
,2-Dichloroethane										
2-Butanone				R	R					
,1,1-Trichloroethane										
Carbon Tetrachloride										
Vinyl Acetate										
romodichloromethane										
,2-Dichloropropane										
is-1,3-Dichloropropene										
richloroethene		7								
ibromochloromethane										
,1,2-Trichloroethane		36								
enzene										
rans-1,3-Dichloropropene										
romoform										
-Methyl-2-Pentanone										
-Hexanone										
etrachloroethene										
oluene										
,1,2,2-Tetrachloroethane										
hlorobenzene										
thylbenzene										
tyrene										
ylenes (Total)										

OTES:
lank space - compound analyzed for but not detected
- compound found in lab blank as well as sample, indicates possible/probable blank contamination
- estimated value
- estimated value, compound present below CRQL but above IDL
- analysis did not pass EPA QA/QC
- Presumptive evidence of the presence of the material
R - analysis not required
-n limits elevated if Dilution

103555

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. . . .
IDO#: 02-9003-01
SAMPLING DATE: 5/15/90
EPA CASE NO.: 14115 LAB: NET MID-ATLANTIC

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

SEMI-VOLATILES										
Sample ID No.	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3(DUP)	NYJL-SED1(MS/MSD)	NYJL-SED2(DUP)	NYJL-RIN1	NYJL-RIN2	NYJL-RIN3	NYJL-RIN4	NYJL-TBLK1
Traffic Report No.	BDK63	BDK64	BDK65	BDK66	BDK67	BDK68	BDK69	BDK72	BDK73	BDP03
Matrix	WATER	WATER	WATER	SEDIMENT	SEDIMENT	WATER	WATER	WATER	WATER	WATER
Units	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor/GPC Cleanup (Y)	1	1	1	1	1	1	1	1	1	N/A
Percent Moisture	--	--	--	44	45	--	--	--	--	N/A
Phenol										NR
bis(2-Chloroethyl)ether										NR
2-Chlorophenol										NR
1,3-Dichlorobenzene										NR
1,4-Dichlorobenzene										NR
Benzyl alcohol										NR
1,2-Dichlorobenzene										NR
2-Methylphenol										NR
bis(2-Chloroisopropyl)ether										NR
4-Methylphenol										NR
N-Nitroso-di-n-dipropylamine										NR
Hexachloroethane										NR
Nitrobenzene										NR
Isophorone										NR
2-Nitrophenol										NR
2,4-Dimethylphenol										NR
Benzoic acid										NR
bis(2-Chloroethoxy)methane										NR
2,4-Dichlorophenol										NR
1,2,4-Trichlorobenzene										NR
Naphthalene										NR
4-Chloroaniline										NR
Hexachlorobutadiene										NR
4-Chloro-3-Methylphenol										NR
2-Methylnaphthalene										NR
Hexachlorocyclopentadiene										NR
2,4,6-Trichlorophenol										NR
2,4,5-Trichlorophenol										NR
2-Chloronaphthalene										NR
2-Nitroaniline										NR
Dimethylphthalate										NR
Acenaphthylene										NR
2,6-Dinitrotoluene										NR
3-Nitroaniline										NR
Acenaphthene										NR
2,4-Dinitrophenol										NR
4-Nitrophenol										NR
Dibenzofuran										NR
2,4-Dinitrotoluene										NR
Diethylphthalate										NR
4-Chlorophenyl-phenyl ether										NR
Fluorene										NR
4-Nitroaniline										NR
4,6-Dinitro-2-methylphenol										NR
N-nitrosodiphenylamine										NR
4-Bromophenyl-phenyl ether										NR
Hexachlorobenzene										NR

103556

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SITE NAME: LI TUNGSTEN
TDD#: 02-9003-01
SAMPLING DATE: 5/15/90
EPA CASE NO.: 14115 LAB: NET MID-ATLANTIC

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

SEMI-VOLATILES										
Sample ID No.	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3(DUP)	NYJL-SED1(MS/MSD)	NYJL-SED2(DUP)	NYJL-RIN1	NYJL-RIN2	NYJL-RIN3	NYJL-RIN4	NYJL-TBLK1
Traffic Report No.	BDK63	BDK64	BDK65	BDK66	BDK67	BDK68	BDK69	BDK72	BDK73	BBP03
Matrix	WATER	WATER	WATER	SEDIMENT	SEDIMENT	WATER	WATER	WATER	WATER	WATER
Units	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor/GPC Cleanup (Y)	1	1	1	1	1	1	1	1	1	N/A
Percent Moisture	--	--	--	44	45	--	--	--	--	N/A
Pentachlorophenol										NR
Phenanthrene										NR
Anthracene										NR
Di-n-butylphthalate					J					NR
Fluoranthene										NR
Pyrene										NR
Butylbenzylphthalate										NR
3,3'-Dichlorobenzidine										NR
Benzo(a)anthracene										NR
Chrysene										NR
bis(2-Ethylhexyl)phthalate				J	J					NR
Di-n-octylphthalate										NR
Benzo(b)fluoranthene										NR
Benzo(k)fluoranthene										NR
Benzo(a)pyrene										NR
Indeno(1,2,3-cd)pyrene										NR
Dibenz(a,h)anthracene										NR
Benzo(g,h,i)perylene										NR

NOTES:
Blank space - compound analyzed for but not detected
- compound found in lab blank as well as sample, indicates possible/probable blank contamination
- estimated value
- estimated value, compound present below CRDL but above IDL
- analysis did not pass EPA QA/QC
- Presumptive evidence of the presence of the material
NR - analysis not required
Detection limits elevated if Dilution Factor >1 and/or percent moisture >0%

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IDD#: 02-9003 01
SAMPLING DATE: 5/15/90
EPA CASE NO.: 14115 LAB: NET MID-ATLANTIC

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

PESTICIDES										
Sample ID No.	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3(DUP)	NYJL-SED1(MS MSD)	NYJL-SED2(DUP)	NYJL-RIN1	NYJL-RIN2	NYJL-RIN3	NYJL-RIN4	NYJL-TBLK1
Traffic Report No.	BDK63	BDK64	BDK65	BDK66	BDK67	BDK68	BDK69	BDK72	BDK73	BDP03
Matrix	WATER	WATER	WATER	SEDIMENT	SEDIMENT	WATER	WATER	WATER	WATER	WATER
Units	ug/L	ug/L	ug/L	ug/kg	ug/kg	ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor/GPC Cleanup (Y)	1	1	1	1	1	1	1	1	1	N/A
Percent Moisture	--	--	--	44	45	--	--	--	--	N/A
alpha-BHC										NR
beta-BHC										NR
delta-BHC										NR
gamma-BHC (Lindane)										NR
Heptachlor										NR
Aldrin										NR
Heptachlor epoxide										NR
Endosulfan I										NR
Dieldrin										NR
4,4'-DDE										NR
Endrin										NR
Endosulfan II										NR
4,4'-DDD										NR
Endosulfan sulfate										NR
4,4'-DDT										NR
Methoxychlor										NR
Endrin ketone										NR
alpha-Chlordane										NR
gamma-Chlordane										NR
Toxaphene										NR
Aroclor-1016										NR
Aroclor-1221										NR
Aroclor-1232										NR
Aroclor-1242										NR
Aroclor-1248										NR
Aroclor-1254										NR
Aroclor-1260										NR

NOTES:
Blank space - compound analyzed for but not detected
- compound found in lab blank as well as sample, indicates possible/probable blank contamination
- estimated value
- estimated value, compound present below CRQL but above IDL
- analysis did not pass EPA QA/QC
- Presumptive evidence of the presence of the material
NR - analysis not required
Detection limits elevated if Dilution Factor >1 and/or percent moisture >0%

103558

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SITE NAME: LI TUNGSTEN
TDD#: 02-9003-01
SAMPLING DATE: 5/15/90
EPA CASE NO.: 14115
LAB NAME: BETZ

TABLE 1
SUMMARY OF SITE INSPECTION ANALYTICAL DATA
(cont'd)

INORGANICS										
Sample ID No.	NYJL-SW1	NYJL-SW2(MS/MSD)	NYJL-SW3(DUP)	NYJL-SED1(MS/MSD)	NYJL-SED2(DUP)	NYJL-RIN1	NYJL-RIN2	NYJL-RIN3	NYJL-RIN4	NYJL-TBLK1
Traffic Report No.	MBCP89	MBCP90	MBCP91	MBCP92	MBCP93	MBCP94	MBCP95	MBCP96	MBCJ65	N/A
Matrix	WATER	WATER	WATER	SEDIMENT	SEDIMENT	WATER	WATER	WATER	WATER	N/A
Units	ug/L	ug/L	ug/L	mg/kg	mg/kg	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	J	J	J	1350	610					NR
Antimony		J			R					NR
Arsenic	J	11	J	72.1	37					NR
Barium	J	J	J	J	J	J	J	J	J	NR
Beryllium				J	J					NR
Cadmium				2.7						NR
Calcium	90700	53100	94100	202000	308000					NR
Chromium				35.4 E	21.5 E					NR
Cobalt	51	366	53	3970	1530					NR
Copper	25	504	25	610	293					NR
ron	J	1760	J	2780	1980	J	J			NR
ead	4.2 E	15.8 E	3.9 E	341	243					NR
agnesium	J	12500	J	J	J					NR
anganese	J	1640	J	1090	491		J			NR
ercury				0.23	0.21					NR
ickel	J	544	J	1110	450					NR
otassium	24900 E	22200 E	24700 E	J		J				NR
elenium		J								NR
ilver				14.3	7.6					NR
odium	919000	53100	867000	7720 E	12600 E	J			J	NR
hallium				R	R					NR
anadium	J		J	112 E	57.2 E					NR
inc	30.7	265 E	35.8	782 E	303 E					NR
yanide	J	11.7	11.4							NR

OTES:
lank space - compound analyzed for but not detected
- estimated value
- estimated value, compound present below CRDL but above IDL
- analysis did not pass EPA QA/QC
R - analysis not required

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The Upper Glacial Aquifer rests unconformably upon the Raritan Clay of Cretaceous Age. In the vicinity of the site, the Raritan Clay occurs at an approximate depth of 175 feet and has an average thickness of 50 feet. The Raritan Clay consists predominantly of light to dark grey, red, white, or yellow clay with variable amounts of silt and fine silty sand. Due to the heterogeneity of sediments within this clay, the permeability is variable; the average vertical permeability is 3.0×10^{-7} cm/sec. Some public supply wells and other private supply wells obtain water from the sandy horizons of the Raritan Clay.

Below the Raritan Clay lies the Lloyd Sand Aquifer of early Cretaceous Age. It can be found at a depth of approximately 225 feet below the surface in the vicinity of the site and is approximately 200 feet thick. The Lloyd Sand consists of discontinuous layers of silt, clay, sandy clay, sand, and gravel that exhibit variations in permeability. The average permeability is 1.7×10^{-2} cm/sec. Groundwater within this aquifer flows from north to south. The Lloyd Sand Aquifer serves six public water supply wells within a 3-mile radius of the Li Tungsten Site and has been designated as a sole source aquifer by the U. S. EPA.

Ref. Nos. 4 (Volume 1, part 4, pp. 14 to 17) 10, 12, 14, 24, 39

3. **Is a designated sole source aquifer within 3 miles of the site?**

A sole source aquifer has been designated within 3 miles of the site.

Ref. Nos. 10, 12, 24

What is the depth from the lowest point of waste disposal/storage to the highest seasonal level of the saturated zone of the aquifer of concern?

Contaminants attributable to the facility were detected in samples GW-9 and GW-10, which were collected by NUS Corporation Region 2 FIT from monitoring well EMW-4, located south of the Mud Pond. The depth to the top of the screened interval in this well has been reported to be 8.6 feet below ground surface. The depth to groundwater below ground surface at the time of sampling was 5 feet. Therefore, the waste is considered to be in contact with the aquifer of concern.

Ref. Nos. 4, 13, 50

What is the permeability value of the least permeable continuous intervening stratum between the ground surface and the aquifer of concern?

'he permeability value of the least permeable continuous intervening stratum between the 'round surface and the Upper Glacial Aquifer is estimated to be greater than 10^{-3} cm/sec.

'f. Nos. 12,14

'at is the net precipitation for the area?

' estimated net precipitation for this area, based upon the normal annual total ipitation minus the mean annual lake evaporation, is approximately 16 inches.

Vo. 14

Ref. 6
39 of 48

7. **Identify uses of groundwater within 3 miles of the site (i.e., private drinking source, municipal source, commercial, industrial, irrigation, unusable).**

Groundwater within 3 miles of the site is used for private drinking sources, public supply wells, and commercial, industrial, and irrigation applications. Many wells have been closed or have restricted use due to volatile organic chemical contamination from undetermined sources.

Ref. Nos. 9, 12, 15, 38, 39

8. **What is the distance to and depth of the nearest well that is currently used for drinking or irrigation purposes?**

The nearest well supplying potable water from the aquifer of concern is located 1.3 miles west of the Warehouse. This well (No. 901) is 68 feet deep and is screened within the Upper Glacial Aquifer. Refer to Table 2 for a list of wells within 3 miles of the site.

Ref. Nos. 6, 12, 39

9. **Identify the population served by the aquifer of concern within a 3-mile radius of the site.**

The population served by the aquifer of concern within a 3-mile radius of the site is approximately 18,000 or more.

Ref. Nos. 9, 12, 16

SURFACE WATER ROUTE

10. **Describe the likelihood of a release of contaminant(s) to surface water as follows: observed, alleged, potential, or none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminants to the facility.**

There is a potential for contaminants to be released to Glen Cove Creek via storm drains on Herb Hill Road and the storm drains on site. Runoff from the landfill and from the main part of the facility enters Glen Cove Creek via these routes. The leaking Mud Holes, Mud Pond, and aboveground 500,000-gallon oil tank are located across the street (Garvies Point Road) from Glen Cove Creek. Chemicals identified in surface soil and groundwater samples around these waste sources include arsenic, selenium, silver, barium, cobalt, chromium, copper, iron, manganese, nickel, strontium, vanadium, zinc, lead, antimony, thallium, aluminum, tungsten, cadmium, titanium, and molybdenum. The site is located on the 100/500-year floodplain; therefore, the potential also exists for surficial contaminants to be transported off site and into Glen Cove Creek via flooding. Surface water samples analyzed for tungsten by inductively coupled plasma mass spectrometry (ICP/MS) were found to contain tungsten, copper, zinc, arsenic, molybdenum, antimony, lead, bismuth, thorium, and uranium.

Ref. Nos . 1, 4 (Volume 1, part 1, pp. 1-14 to 1-15), 8, 21, 22, 27, 28, 31, 32, 37, 40, 43

11. **Identify and locate the nearest downslope surface water. If possible, include a description of possible surface drainage patterns from the site.**

The nearest downslope surface water is Glen Cove Creek, which generally flows southwest but is also affected by the tides. Glen Cove Creek is adjacent to the south property boundary; it then flows into Hempstead Harbor and Long Island Sound. Runoff from the site and from storm drains on Herb Hill Road can drain directly into Glen Cove Creek via several outfalls.

Ref. Nos. 6, 8, 27, 43, 44

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TABLE 2
WELLS WITHIN 3 MILES OF LI TUNGSTEN, GLEN COVE, NY

UN = Unused, P.S. = Public Supply, IND = Industrial, COM = Commercial, IRR = Irrigation, UNK = Unknown, AC = Air Conditioning

Well No.	Use	Contaminated
109	UN	
110	UN	
112	UN	
114	IRR	
115	UN	
116	UN	
117	UN	
119	P.S.	
120	UN	
121	UN	
121A	IRR	
660	IND	
661	UN	
801-818	UN	
834	UN	
835	P.S.	
842	UN	
901	P.S.	
902	P.S.	
903	P.S.	
904	UN	
905-909	P.S.	
1037	P.S.	
1149-1153	UN	
1171-1174	UN	
1327	P.S.	
1595	P.S.	
1651	P.S.	
1917	IND	
2027	UN	
2060	UN	
2087	IND/UN	
2316	IND	X
2616	IRR	
3310	IND	
3466	P.S.	X
3892	P.S.	X
4432	COM	
4440	DOM	
4462	UN	
4639	UNK	
5071	IRR	
5201	P.S.	
5250	UN	
5261	P.S.	X

Ref. 6
41.!43

TABLE 2 (CONTINUED)

Well No.	Use	Contaminated
5450	IRR	
5762	P.S.	
5792	P.S.	
6289	UN	
6289	IRR	
6416	UN	
6444	IRR	
6549	IND	
6579	UNK	X
6587	UN	
6665	UN	
6668-70	UN	
6708	UN	
6806	IRR	
6881	UN	
6883	UN	
6973	UN	
7427	IND	X
7439	UNK	
7614	IND	
7664	IRR	X
7782	AC	
7834	IRR	
7857	P.S.	
8048	UNK	
8224	IND	
8259	UN	
8326	P.S.	X
8327	P.S.	X
8394	UNK	
8690	UNK	
8709	IND	
8716	UN	
8887	IND	X
8898	UN	
8937	COM	
9066	UN	
9100	UN	
9115	UN	
9117	UN	
9210	P.S.	
9211	P.S.	
9334	P.S.	

Ref. Nos. 10, 12, 39

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12. **What is the facility slope in percent? (Facility slope is measured from the highest point of deposited hazardous waste to the most downhill point of the waste area or to where contamination is detected.)**

The facility slope, as measured from the northern boundary of the landfill to the southern boundary of the landfill, is 5 percent.

Ref. Nos. 4, 6,13

13. **What is the slope of the intervening terrain in percent? (Intervening terrain slope is measured from the most downhill point of the waste area to the probable point of entry to surface water.)**

The slope of the intervening terrain, as measured from the southern boundary of the landfill to Glen Cove Creek, is less than 2 percent.

Ref. Nos. 6, 8, 13

14. **What is the 1-year 24-hour rainfall?**

The 1-year 24-hour rainfall for the area is approximately 3 inches.

Ref. No. 14

15. **What is the distance to the nearest downslope surface water? Measure the distance along a course that runoff can be expected to follow.**

Glen Cove Creek is adjacent to the southern property boundary. Previously permitted outfalls and on-site storm drains discharge through the bulkhead along the southern property boundary directly into Glen Cove Creek.

Ref. Nos. 8, 13, 27, 43, 44

16. **Identify uses of surface waters within 3 miles downstream of the site (i.e., drinking, irrigation, recreation, commercial, industrial, not used).**

Surface water uses within 3 miles downstream of the site include recreational and commercial.

Ref. Nos. 6, 20

17. **Describe any wetlands, greater than 5 acres in area, within 2 miles downstream of the site. Include whether it is a freshwater or coastal wetland.**

No wetlands greater than 5 acres in area have been identified within 2 miles downstream of the site.

Ref. Nos. 6, 20

18. **Describe any critical habitats of federally listed endangered species within 2 miles of the site along the migration path.**

No critical habitats of federally listed endangered species have been identified within 2 miles of the site. However, Hempstead Harbor is a waterfowl wintering area most noted for scaup, canvasback, and black ducks, and is a nursery/feeding habitat for striped bass, bluefish, Atlantic

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silverside, menhaden, winter flounder, and blackfish. Hempstead Harbor has been designated as a "significant coastal fish and wildlife habitat" by the NYS Department of State under Policy 7 of the Waterfront Revitalization and Coastal Resources Act of 1981.

Ref. Nos. 6, 7, 20, 23, 25

19. What is the distance to the nearest sensitive environment along or contiguous to the migration path (if any exist within 2 miles)?

No sensitive environments have been identified along Glen Cove Creek or Hempstead Harbor within 2 miles of the site.

Ref. Nos. 6, 7, 20, 23, 25

20. Identify the population served or acres of food crops irrigated by surface water intakes within 3 miles downstream of the site and the distance to the intake(s).

There are no crops irrigated by surface water intakes within 3 miles downstream of the site.

Ref. Nos. 6,11

21. What is the state water quality classification of the water body of concern?

The state water quality classification for Hempstead Harbor north of Bar Beach is Class SA (suitable for shellfishing for market purposes and primary/secondary recreation). The state water quality classification for Glen Cove Creek is Class 1 (secondary contact recreation except for primary recreation and shellfishing).

Ref. No. 18

22. Describe any apparent biota contamination that is attributable to the site.

Biota contamination attributable to the site exists along the grassy areas around the Mud Pond, Mud Holes, and the nine waste piles. There was a notable lack of vegetation around these areas, and grass near the fence along Garvies Point Road was stained black.

Ref. Nos. 4, 5, 13

AIR ROUTE

23. Describe the likelihood of a release of contaminant(s) to the air as follows: observed, alleged, potential, none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminant(s) to the facility.

There is a potential for release of contaminants from the site into the air. Tank covers, siding shingles, roofing tiles, and pipe wrapping, all of which are known to contain asbestos, are in a state of decay. However, analyses of indoor and outdoor air samples previously collected from the site indicate the presence of little or no volatile organic chemicals and airborne metals; analyses also indicate little or no asbestos particulates. Larger pressurized tanks containing aqueous ammonia and propane, and open-air tanks containing hydrochloric acid and tungsten acid could potentially release their contents to the air.

Ref. Nos. 4 (Volume 1, part 1, pp.1-6; Volume 2, part 6), 13, 25, 26, 34, 35, 36, 41

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24. **What is the population within a 4-mile radius of the site?**

The population within a 4-mile radius of the site is approximately 67,900.

Ref. No. 17

FIRE AND EXPLOSION

25. **Describe the potential for a fire or explosion to occur with respect to the hazardous substance(s) known or suspected to be present on site. Identify the hazardous substance(s) and the method of storage or containment associated with each.**

There is a potential for fire or explosion to occur with respect to the hazardous substances known to be present on the site. An outdoor, partially filled and pressurized tank of propane gas and a pressurized tank of aqueous ammonia are present on site and represent a potential for an explosion or fire to occur. In a letter to the NYSDEC dated January 31, 1990, the mayor of the City of Glen Cove expressed his concern about the potential for a fire to occur at the site and for the safety of local fire fighters who would have to enter the site, if such an event were to occur.

Ref. Nos. 4 (Part 6), 13, 25, 26, 33, 41

26. **What is the population within a 2-mile radius of the hazardous substance(s) at the facility?**

The population within a 2-mile radius of the hazardous substances present on the site is approximately 35,400.

Ref. No. 17

DIRECT CONTACT/ON-SITE EXPOSURE

27. **Describe the potential for direct contact with hazardous substance(s) stored in any of the waste units on site or deposited in on-site soils. Identify the hazardous substance(s) and the accessibility of the waste unit.**

There is a potential for direct contact with the hazardous substances deposited in on-site soils, which include heavy metals, PCBs, and radioactive elements. Along Garvies Point Road, the Mud Pond has overflowed and stained the soil. The stained soil contains notable concentrations of arsenic, antimony, chromium, copper, lead, mercury, vanadium, and zinc.

Ref. Nos. 4, 5, 13, 21, 33, 36, 49, 50

28. **How many residents live on a property whose boundaries encompass any part of an area contaminated by the site?**

There are no residents who live on a property whose boundaries encompass any part of an area contaminated by the site.

Ref. Nos. 5, 13, 50

29. **What is the population within a 1-mile radius of the site?**

The population within a 1-mile radius of the site is approximately 9,900.

Ref. No. 17

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PART V: ACTUAL HAZARDOUS CONDITIONS

Waste processed ore containing heavy metals and radioactive isotopes of uranium, thorium, and radium occur in nine waste piles and within many drums and crates in many parts of the site. The drums and crates are badly weathered, corroded, and spilling their contents on the ground. Particulates from the waste piles can become airborne as they are not covered. The waste piles also contain radioactive slags mixed with the soil, and several separate piles containing large chunks of radioactive slag have been roped off and marked with radiation placards; however, radioactive slag is not considered a hazardous waste in New York State. The Li Tungsten Site has been designated as a Class 2 site (significant threat to public health or environment) on the NYSDEC registry because of the presence of other contaminants. The stained soil on the corner of Garvies Point Road contains notable concentrations of many heavy metals. Several 55-gallon drums containing elevated levels of radioactive waste process ore and soil that was excavated from behind the wooden fence at the corner of Garvies Point and Herb Hill Roads have been stored within the Dice Building until an approved disposal site for New York State has been established. Tank covers, pipe wrappings, wallboard, and shingles on site contain asbestos. These items are known to be in poor condition and have been found in broken pieces upon the ground. Although air testing previously conducted has not shown the presence of airborne asbestos particles, the potential exists for a release of particulates to the air. Also, many wooden, steel, or fiberglass tanks still contain process solutions containing heavy metals and concentrated or spent acids and bases. There are two pressurized tanks on site, one of which contains aqueous ammonia and the other propane gas. Although the site is patrolled by a one-man private security force, the site is very large and the fence surrounding the site has been broken many times; therefore, there is a potential for unauthorized entry to the site. The buildings on the site are in poor condition and local officials have expressed a concern for the safety of their firemen; they are especially concerned about the asbestos dusts and particulates that may be released if a fire should break out on the site. At least four different contaminant plumes have been identified as a result of several groundwater sampling events conducted on site.

No other actual hazardous conditions pertaining to human or environmental contamination have been documented. Specifically:

- Contamination has not been documented either in organisms in a food chain leading to humans or in organisms directly consumed by humans.
- There have been no documented observed incidents of direct physical contact with hazardous substances at the site involving a human being (not including occupational exposure) or a domestic animal.

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- **There have been no documented incidents of damage to fauna (e.g., fish kill) that can be attributed to the hazardous materials at the facility.**

Ref. Nos. 4, 13, 25, 26, 33, 36, 49, 52

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PART VI: SITE SUMMARY AND RECOMMENDATIONS

Li Tungsten is located in an industrial area on approximately 26 acres along the north bank of Glen Cove Creek in the City of Glen Cove, Nassau County, New York. From the 1940s to the early 1980s, tungsten ores imported from Mainland China and Canada were smelted at this facility for the making of tungsten carbide powder, tungsten wire, and welding rods. In 1985, the company filed for bankruptcy; the property is presently owned by the Glen Cove Development Company located in Baltimore, Maryland.

Although the site is presently inactive, most of the wastes generated by the facility remain on site. These wastes include 17,000 tons of solid residue/ore materials in piles, in a landfill, in wooden crates, and in 30- and 55-gallon drums. Some of the drums are overstacked and some have toppled and have broken open, spilling their contents upon the ground. One hundred and eight drums containing acids, waste oil, and organics have been overpacked and/or staged to a secure area on site. The remaining unsound drums are also recommended for overpacking to eliminate the potential for a release of their contents. Elsewhere on the site, there are approximately 373,000 gallons of various liquids stored in 224 aboveground tanks of unknown physical condition, some of which contain hazardous organic and inorganic liquids. The inorganic liquids include spent or unused hydrochloric acid and aqueous ammonia. Fifty tanks have been inspected for leaks and rupture. Two tanks were determined not to be secure and have been drained and their contents drummed for disposal. Small quantities of identifiable chemicals have been overpacked and secured, while small quantities of unidentified chemicals remain in some areas. Thirty-eight electrical transformers formerly located on site, three of which contained PCB-contaminated oil, have been drained, drummed, and disposed of at a licensed off-site facility. Removal activities have also begun with respect to some of the surficial containers (including pressurized cylinders).

A site investigation conducted by a consulting firm on behalf of the site owner was completed in May of 1988, during which samples were taken from 10 existing groundwater monitoring wells and 13 more monitoring wells were installed. Analyses of samples from these wells identified four underground plumes within the groundwater of the Upper Glacial Aquifer. One plume occurs at a depth of approximately 20 feet along the eastern boundary of the site and was found to contain several dry cleaning solvents related to tetrachloroethylene. The plume is believed to originate from a dry cleaning facility that formerly occupied the property adjacent to the site. Another plume was found along the western boundary of the site and was traced to an adjacent property formerly occupied by a petrochemical company. Both plumes are moving south towards Glen Cove Creek. Another plume of No. 2 fuel oil occurs in the vicinity of a leaking 500,000-gallon tank north of Garvies Point Road. The last plume is located around the Mud Pond/Mud Holes, which contain waste processing water and heavy metals. Chloride and sulfate compounds, and notable concentrations of

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PART VI: SITE SUMMARY AND RECOMMENDATIONS (CONT'D)

lead, cadmium, tungsten, chromium, arsenic, barium, and silver have been detected in groundwater samples collected from this area. The materials leaking from the fuel oil tank and the ponds have also scarred the vegetation and stained the soil in this area. Asbestos fibers from decaying tank covers and pipe wrapping materials are known to be present on the ground. Similarly, waste piles containing raw and processed tungsten ores are known to contain radioactive radium, uranium, and thorium compounds used in the ore refining process. The United States Environmental Protection Agency issued an Administrative Order on Consent to the Glen Cove Development Company on July 21, 1989, outlining initial actions to be taken at the site. The site is scheduled for a cleanup of hazardous wastes including, but not limited to, the removal of drums, the contents of the tanks, and the laboratory chemicals, but plans for cleanup of the groundwater and soil have not been finalized. Development as a residential area is planned for the site.

Analytical results from groundwater, surface water, soil, and sediment samples collected from this site by NUS Corporation Region 2 FIT in April and May of 1990 indicate a release of significant concentrations of contaminants associated with tungsten refining to the environment. Elevated concentrations of antimony, arsenic, barium, beryllium, copper, cobalt, chromium, lead, manganese, mercury, nickel, vanadium, cadmium, uranium, thorium, molybdenum, bismuth, zinc, and cyanide were detected in soil and/or groundwater samples. The uranium and thorium compounds are known to be radioactive. Analytical results from the surface water and sediment samples collected from on-site waste sources indicate the presence of notable concentrations of PCBs (Aroclor-1248 and Aroclor-1254) and elevated concentrations of metals. Two of the surface water samples collected from on-site waste sources contained cyanide. Surface water samples collected from Glen Cove Creek showed the presence of tetrachloroethene; sediment samples collected from the creek contain polycyclic aromatic hydrocarbons and elevated concentrations of several metals.

Based upon the high target population potentially affected by groundwater contamination and the potential for direct contact with some of the wastes on site, the Li Tungsten Site is recommended for a **LISTING SITE INSPECTION**. All of the radioactive waste piles should be roped off from unauthorized access and labelled with radiation placards until they can be contained/covered, removed from the site, and properly stored at a licensed facility. The propane and aqueous ammonia tanks and other large process tanks containing organic and inorganic liquids/residues should be emptied and disposed of properly. The remaining drums, barrels, and crates of tungsten ore/residues should be recycled or processed at another tungsten refining facility. The many empty 55- and 30-gallon drums on site should be crushed and properly disposed. Lastly, a cleanup plan for the contaminated groundwater, surface water, soil, and sediment should be formulated.

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MALCOLM PIRNIE

ARCS II

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Contract No. 68-W9-0051

LI TUNGSTEN
GLEN COVE, NEW YORK

Work Assignment No. 025-2L4L

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WORK PLAN
PART I OF II

Remedial Planning Activities at Selected Uncontrolled Hazardous Substance Disposal Sites USEPA Region II (NY, NJ, PR, VI)

Malcolm Pirnie, Inc.
2 Corporate Park Drive
White Plains, New York 10602

March 1993

Ref. 7
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WORK PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

PART I OF II

LI TUNGSTEN

GLEN COVE, NEW YORK

MARCH 1993

ARCS Contract No. 68-W9-0051

USEPA Work Assignment No. 025-2L4L

MALCOLM PIRNIE, INC.
2 Corporate Park Drive
White Plains, New York 10602

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ARCS II CONTRACT NO. 68-W9-0051

WORK ASSIGNMENT # 025-2L4L

SITE NAME: LI LUNGSTEN

RI/FS WORK PLAN

MARCH 1993

CONTRACTOR QA/QC SIGN-OFF

Malcolm Pirnie, Inc. has reviewed this draft document in accordance with the contractor's ARCS II QAPP and is submitting it to USEPA, Region II in compliance with the requirements under Work Assignment No. 025-2L4L and Contract No. 68-W9-0051.

This document has not been approved by USEPA Region II and is not intended for release to the public.

Dennis G. McGrath	S.K. Krishnaswami
SITE MANAGER	ARCS II PMO PROGRAM MANAGER
Date: 18 March 1993	Date: March 19, 1993

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LI TUNGSTEN RI/FS
WORK PLAN

EXECUTIVE SUMMARY

SITE LOCATION AND BACKGROUND

The Li Tungsten site is located at 63 Herb Hill Road in the City of Glen Cove, Nassau County, Long Island, New York. This site has a complex history of name and ownership changes, and environmental site assessments, investigations and removal actions. Specific details are discussed in Section 2.0. From early 1940's until approximately 1985, tungsten ores or concentrates, imported primarily from mainland China, South America and Canada, were smelted at this facility for the production of tungsten carbide powder, tungsten wire, and welding rods (NUS, 1989; 1990). In 1985 the company filed for bankruptcy and the facility ceased operation.

Large quantities of the ore concentrates were left on site in various processed and unprocessed forms. The ore which is present in drums, wooden crates and piles both inside and outside the buildings, contains heavy metals and radioactive isotopes of uranium, thorium, and radium. Many of the drums and crates located outside are weathered and/or corroded to a point where the contents have spilled on the ground. In other areas, the drums have been over-stacked and have become very unstable as the drums deteriorated and corroded.

Numerous aboveground wooden, steel or fiberglass tanks were used during the various smelting processes, and to store reactants (e.g., hydrochloric acid, ammonia, hydrogen) and/or intermediate compounds (e.g., ammonium paratungstate or APT). Some of these tanks may still contain some hazardous and inorganic liquids. As the tungsten ore moved through its various processing stages, the radioactive isotopes became more concentrated in the residual waste or slag. There are indications that some of this slag was placed in waste piles at the ground surface and/or buried on site (NUS, 1989; 1990). Heavy metals which constitute impurities that were removed during the extraction process include: antimony, arsenic, barium, bismuth, copper, cobalt, chromium, lead, manganese, mercury, molybdenum, nickel, thorium, uranium, vanadium, and zinc.

Several of the buildings on site have deteriorated to a point where they represent a physical safety hazard. Portions of some walls and roofs have collapsed. In addition, friable and non-friable asbestos is present as pipe wrap, tank insulation, siding shingles, and roof tiles. Standing water in the West Dice Building has flooded and concealed a deep pit in the floor.

Previous Site Investigations

Various site investigation activities were conducted at the site between 1988 and 1990 by the Nassau County Department of Health (NCDOH), the New York State Department of Environmental Conservation (NYSDEC), the potentially responsible parties (PRPs), and the United States Environmental Protection Agency (USEPA). Results of these sampling activities have indicated the presence of heavy metals, fuel oil constituents, and volatile organics in the groundwater, surface water, sediments and soils.

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Current Conditions

The Li Tungsten site ceased operations in June 1985 and has been inactive since. Site security (fencing and guard) was addressed as one of the interim remedial measures in the AOC. Although a one person security guard is maintained on a 24-hour basis, the site could be entered without the knowledge of the security force through breaks in the fence. During the site tour, observations were made that vandalism has occurred. Many of the salvageable fixtures (e.g., copper wiring and piping) have been removed and general debris (e.g., washing machines, mattresses) have been left behind.

OBJECTIVE OF THE RI/FS

This Remedial Investigation/Feasibility Study (RI/FS) is designed to collect sufficient data on the nature and extent of contamination to remediate the site. In achieving this objective, these data will be used to determine contamination sources, identify migration pathways, perform an assessment of human health and ecological risks, and support the selection of remedial alternatives to mitigate or reduce risks in accordance with the requirements of the National Contingency Plan (NCP) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Re-authorization Act of 1986 (SARA).

The Health and Safety Plan (HASP), and Field Operations Plan (FOP), which includes the Quality Assurance Project Plan (QAPjP) and the Field Sampling Plan (FSP), will be prepared after the Work Plan has been approved by the USEPA.

INITIAL EVALUATION

The contamination at the Li Tungsten site exists in the groundwater, soil, surface water and sediments. The groundwater contains VOCs and inorganic compounds. The major VOCs contamination is present in two areas and may be related to two off-site sources. The inorganic contamination on-site is a result of the past facility operations and disposal practices. Drums, crates and piles of processed ore and slag will continue to act as contaminant source to the groundwater until they are removed. The disposal area in Parcel B, the two Mud Holes, the Mud Pond and the storm drains are also potential contaminant sources.

The surface water contamination consists mostly of inorganic compounds and relative low levels of VOCs. Continuing sources to surface water contamination consists of runoff from the residual ores, the disposal area in Parcel B, and the storm drains.

During site visits, several safety related observations were made. These observation related to obstructions and site conditions that would affect worker safety in the performance of RI field investigation tasks. To eliminate these safety hazards, we propose that additional interim remedial actions be implemented to address each of the safety hazards, before RI field investigation tasks are initiated.

1.0 INTRODUCTION

1.1 Overview

The Li Tungsten Corporation (Li Tungsten) site is an inactive 26 acre site located at 63 Herb Hill Road, City of Glen Cove, Nassau County, New York (USEPA ID #NYD986882660). From early 1940's until approximately 1985, tungsten ores or concentrates, imported primarily from mainland China, South America and Canada, were smelted at this facility for the production of tungsten carbide powder, tungsten wire, and welding rods (NUS, 1989; 1990). In 1985 the company filed for bankruptcy and the facility ceased operation.

Large quantities of the ore concentrates were left on site in various processed and unprocessed forms. The ore which is present in drums, wooden crates and piles both inside and outside the buildings, contains heavy metals and radioactive isotopes of uranium, thorium, and radium. Many of the drums and crates located outside are weathered and corroded to a point where the contents have spilled on the ground. In other areas, the drums have been overstacked and have become very unstable as the drums deteriorated and corroded. Since many of the drums contain radioactive material, they represent both a potential health hazard as well as a physical safety hazard.

The amount of extractable tungsten in a specific ore is dependent on the ore characteristics and the mineral assemblages of the ore. While tungsten occurs in 29 known mineral species, numerous isomorphous substitutions are possible within the tungsten minerals. It was necessary during the smelting, therefore, to be able to vary the extraction process to separate the various accessory metals (or impurities) depending upon the specific type of ore or concentrate that was imported. The smelting was generally conducted in relatively small batches, to permit any individual or combination of extraction treatments. Typical treatments in the smelting included physical, chemical and mechanical processes including: sizing and crushing; gravity, magnetic and electrostatic separation; roasting; leaching; floatation; and fusion. An analytical laboratory was located on site to perform chemical analysis on the ore and pilot testing of the extraction treatments.

Numerous aboveground wooden, steel or fiberglass tanks were used to perform the extraction treatments and to store reactants (e.g., hydrochloric acid, ammonia, hydrogen) and/or intermediate compounds (e.g., ammonium paratungstate or APT). Some of these tanks may still contain some hazardous and inorganic liquids. As the tungsten ore moved through its various processing stages, the radioactive isotopes became more concentrated in the residual waste or slag. There are indications that some of this slag was placed in waste piles at the ground surface and/or buried on site (NUS, 1989; 1990). Heavy metals which constitute impurities that were removed during the extraction process include: antimony, arsenic, barium, bismuth, copper, cobalt, chromium, lead, manganese, mercury, molybdenum, nickel, thorium, uranium, vanadium, and zinc.

Many of the buildings on site have deteriorated to a point where they are not considered safe to enter. Portions of some walls and roofs have collapsed. Friable and non-friable asbestos is present as pipe wrap, tank insulation, siding shingles, and roof tiles. Standing water in the West Dice Building has flooded a deep pit in the floor.

Various site investigation activities were conducted at the site between 1987 and 1990 by the Nassau County Department of Health (NCDOH), the New York State Department of Environmental Conservation (NYSDEC), the potentially responsible parties (PRPs), and the United States Environmental Protection Agency (USEPA). Results of these sampling activities have indicated the presence of heavy metals, fuel oil constituents, and volatile organics in the groundwater, surface water, sediments and soils.

This Remedial Investigation/Feasibility Study (RI/FS) is designed to collect sufficient data on the nature and extent of contamination to remediate the site. In achieving this objective, these data will be used to determine contamination sources, identify migration pathways, perform an assessment of human health and ecological risks, and support the selection of remedial alternatives to mitigate or reduce risks in accordance with the requirements of the National Contingency Plan (NCP) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

1.2 Approach to Development of Work Plan

Malcolm Pirnie, Inc., (MPI) is submitting this Work Plan to the USEPA in response to Work Assignment #025-2L4L under the Alternative Remedial Contracting Strategy (ARCS)

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Contract No. 68-W9-0051. This Work Plan presents the proposed technical scope of work for the RI/FS and includes a schedule for the performance of the work.

This Work Plan has been prepared in accordance with current USEPA guidance. The following are several of the documents specifically applicable to preparation of an RI/FS that were considered in preparing this Work Plan:

- Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01. (USEPA, 1988a)
- Data Quality Objectives: Development Guidance for Uncontrolled Hazardous Waste Site Remedial Response Activities, OSWER Directive 9355.0-7B, (USEPA, 1987a).
- Interim Guidance of Superfund Selection of Remedy, OSWER Directive 9355.0-19, (USEPA, 1986a).
- Additional Interim Guidance for FY-87 Records of Decision, OSWER Directive 9355.0-21, (USEPA, 1987b).
- Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual Part A (USEPA, 1989a).
- Risk Assessment Guidance for Superfund, Volume II, Environment Evaluation Manual (USEPA, 1989b).
- Superfund Exposure Assessment Manual (USEPA, 1986b).
- Draft Generic Work Plan Guidance (USEPA, 1989c).
- CERCLA Compliance with Other Laws Manual, Interim Final. EPA/540-/G-89/006. Office of Emergency and Remedial Response, Washington, D.C. August 1988, 195 pp, (USEPA, 1988b).
- Guide for Conducting Treatability Studies Under CERCLA (Interim Final) EPA/540/2-89/058, December 1989, 138 pp, (USEPA, 1989d).

Preparation of this Work Plan was based upon a review and consideration of data, information, and discussions related to the following:

- Two site visits by MPI personnel on September 1, 1992 and February 3, 1993.

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- USEPA comments on the Draft Work Plan, letter dated December 24, 1992 and subsequent discussions.

- Scoping meeting with the USEPA held on September 3, 1992.

- Li Tungsten Site Investigation Report. Prepared for Compon Reality Corporation, New York, NY by RTP Environmental Associates, Inc., Westbury, NY, May 1988, 2 volumes (RTP, 1988).

- Final Draft, Preliminary Assessment, Li Tungsten, Glen Cove, NY. Revision No. 1 dated October 18, 1989 with Appendices (NUS, 1989).

- Final Draft, Site Inspection Report, Li Tungsten, Glen Cove, NY. September 28, 1990 with Appendices (NUS, 1990).

- Interim Remedial Actions Report. Prepared for Glen Cove Development Company, April 4, 1990 (HART, 1990).

- Final Remedial Investigation Report, Mattiace Petrochemical Site, Operable Unit One, Glen Cove, NY. Volumes I and II (EBASCO, 1991).

- Topographic Map - Sea Cliff, NY Quadrangle, 1:24,000, Photorevised 1979 (USGS, 1979).

1.3 Scope of Work

The scope of work for this Work Plan was outlined in the Work Assignment Form and Statement of Work which was transmitted to MPI from the USEPA in a letter from the Contracting Officer (CO) dated August 26, 1992. The Statement of Work identified the following tasks:

- Review existing background documents provided by USEPA.

- Develop an RI/FS Work Plan that is comprehensive enough to support a Record of Decision (ROD) for the entire study area.

- Attend scoping meeting within 10 days after issuance of the work assignment.

1.4 Work Plan Content

This Work Plan is organized into nine sections of text including references and a glossary. A brief description of each section follows.

Section 1.0, INTRODUCTION, presents an overview of the environmental conditions at the site, the approach used in developing the Work Plan, the scope of work, and the organization and content of the Work Plan.

Section 2.0, SITE BACKGROUND AND SETTING, presents the background of the site including the location, history and current conditions.

Section 3.0, INITIAL EVALUATION, presents an initial evaluation of the existing data base. This section includes a description of the types of waste present, site hydrogeology, climate, population and environmental resources, migration and exposure pathways, a preliminary identification of applicable or relevant and appropriate requirements (ARARs), a preliminary assessment of public health and environmental impacts, a summary of additional data requirements, remedial action objectives, and recommendations for interim remedial actions to be completed before the RI is initiated.

Section 4.0, WORK PLAN RATIONALE, includes the Data Quality Objectives (DQOs) for RI sampling and analytical activities, and the approach for preparing the Work Plan, which illustrates how the activities will satisfy data needs.

Section 5.0, TASK PLANS FOR RI/FS, presents a proposed scope for each standard task of the RI/FS in accordance with the RI/FS guidance document (USEPA 1988a).

Section 6.0, PROJECT SCHEDULE, presents the anticipated schedule for the RI/FS tasks.

Section 7.0, PROJECT MANAGEMENT APPROACH, presents project management considerations that define relationships and responsibilities for selected task and project management teams.

Section 8.0, REFERENCES, provides a list of references used to develop material presented in this Work Plan.

Section 9.0, GLOSSARY OF ABBREVIATIONS, provides a glossary of abbreviations and acronyms used in this Work Plan.

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The Health and Safety Plan (HASP), and Field Operations Plan (FOP), which includes the Quality Assurance Project Plan (QAPjP) and the Field Sampling Plan (FSP), will be prepared after the Work Plan has been approved by the USEPA.

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2.0 SITE BACKGROUND AND SETTING

2.1 Site Location

The Li Tungsten site is located at 63 Herb Hill Road in the City of Glen Cove, Nassau County, Long Island, New York. A regional map and a site location map are provided in Figures 2-1 and 2-2, respectively. The geographic coordinates of the site are latitude 40°51'36" North and longitude 73°38'25" West. Also located on Figure 2-2 is the adjacent Mattiace Petrochemical site which is on the National Priorities List (NPL) and was the subject of a recently completed an RI/FS directed by the USEPA (EBASCO, 1991).

The site is approximately 26 acres and consists of four (4) separate parcels designated A, B, C and C'. For the purpose of this Work Plan and subject to the findings of the field investigation, the study area is defined as the entire 26 acres. The location of Parcels A, B, C and C' and the significant site features on each parcel are shown on the site plan in Figure 2-3.

Parcel A is approximately seven acres and served as the main operations center when the site was active. It contains the majority of buildings, structures (e.g., tanks, two surface impoundments) and drums/crates of tungsten ore. It is bounded by Herb Hill Road on the north, Garvies Point Road on the west, an adjoining property on the east, and Glen Cove Creek on the south. Parcel B is the smallest of the three parcels, approximately six acres, and is located due north of Parcel A. Parcel B is bounded by Herb Hill Road on the south, Dickson Lane on the west, The Place on the north, and an adjoining property on the east. The area south of the pond on Parcel B was used primarily as a parking lot when the plant was active, however, disposal activities also are believed to have taken place north of the pond (RTP, 1988). The disposal area north of the pond on Parcel B has been referred to in previous reports (HART, 1990; NUS, 1989, 1990, 1991) as a "landfill". Observations made during the second site visit confirmed that disposal activities have taken place in that portion of Parcel B, but insufficient information is available to confirm that actual landfilling operations took place. Further references to this area in the Work Plan text and on figures, therefore, will refer to it as a disposal area. Parcel C is the largest of the three parcels, approximately 14 acres, however, not all of this parcel was part of the Li Tungsten property during active site operations. The Glen Cove Development Corporation (GCDC) acquired

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FIGURE 2-1

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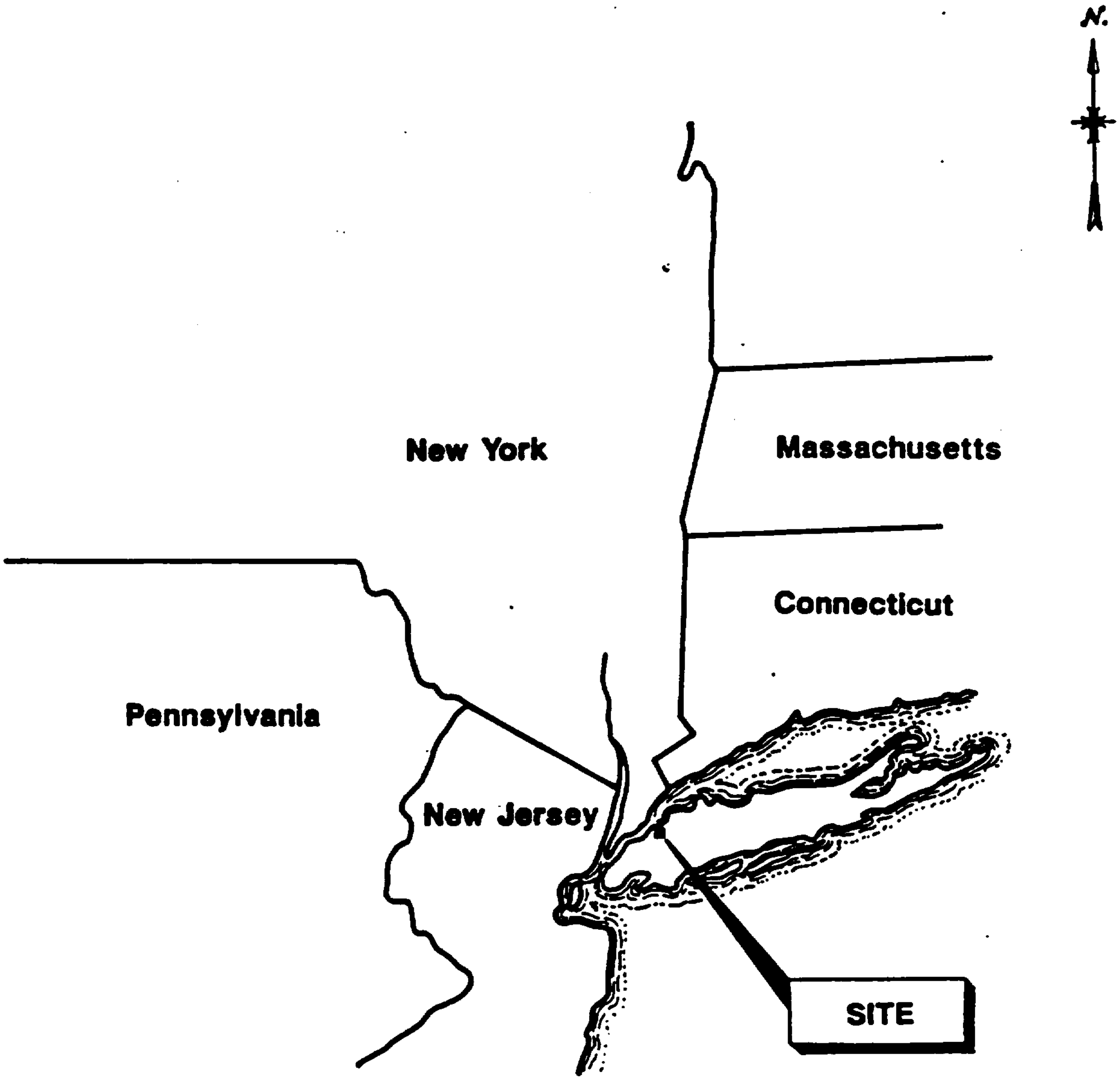

MALCOLM PIRNIE

LI TUNGSTEN
GLEN COVE, NEW YORK
REGIONAL LOCATION MAP

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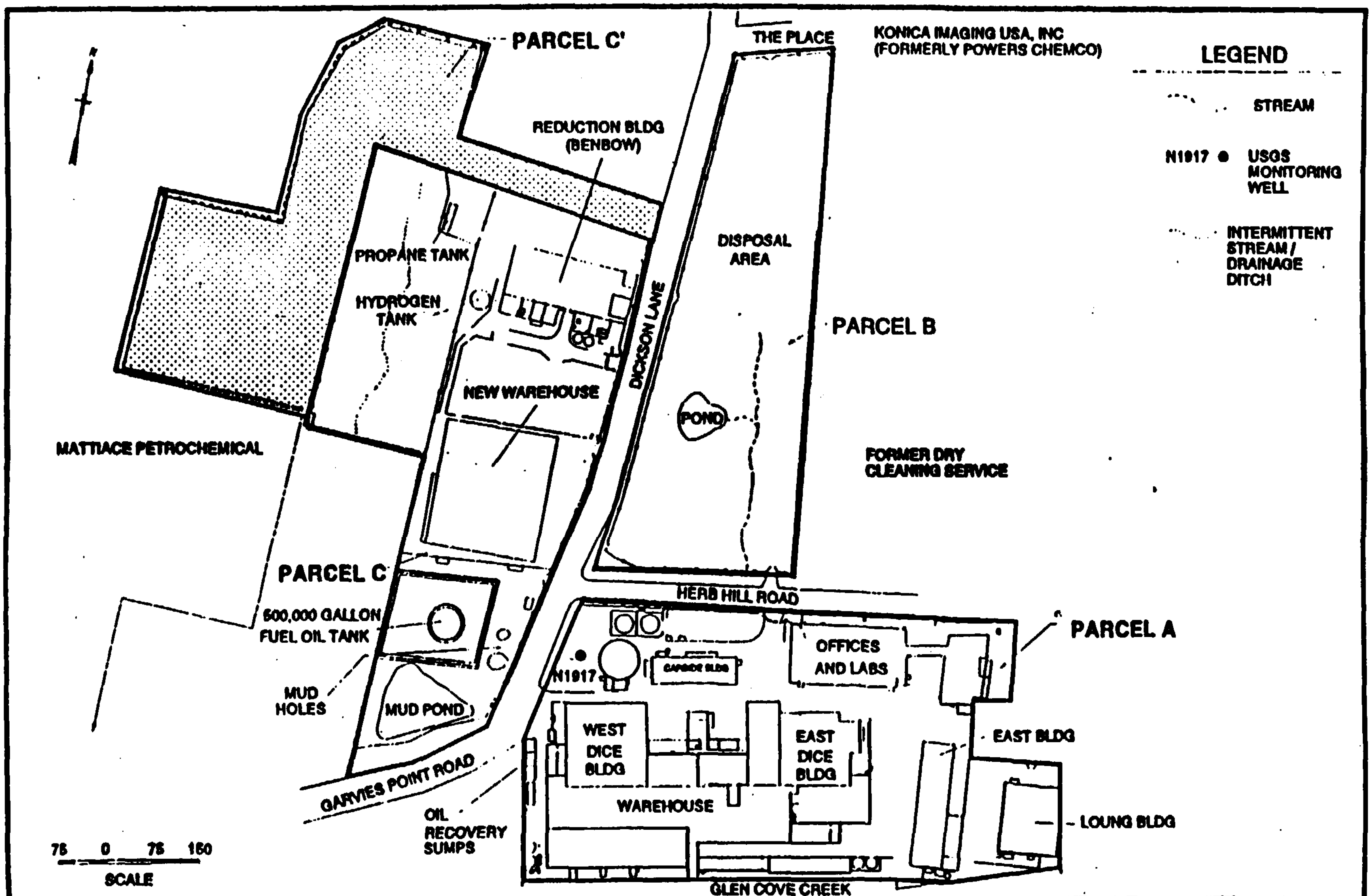

MALCOLM PIRNIE

LI TUNGSTEN, GLEN COVE, LONG ISLAND, NY

SITE PLAN

MALCOLM PIRNIE, INC

FIGURE 2-3

103585

approximately four acres of undeveloped property, designated Parcel C', sometime after 1984. Parcel C contains several buildings, a 500,000 gallon aboveground fuel oil storage tank, and three surface impoundments (e.g., Mud Pond and two Mud Holes) used to dispose of process waste water.

2.2 Site History

This site has a complex history of name and ownership changes, and environmental site assessments, investigations and removal actions. Specific details are discussed in the paragraphs below. The chronological history of site ownership, operations, and preliminary investigations/interim remedial actions is summarized in Table 2-1.

Early in the 1940's the National Reconditioning Company was formed by Kuo Ching (K.C.) Li. The company was operated and managed by the Wah Chang Trading Corporation of New York. In addition to being the chairman and chief engineer of Wah Chang Trading Corporation, K. C. Li was also a distinguished mining engineer, discoverer of tungsten in China, and was responsible for first importing tungsten into the United States. The purpose of the company was to build a facility in Glen Cove, NY, to concentrate tungsten ores.

The facility became operational in 1942. Operation consisted of processing raw ore and scrap tungsten concentrates to produce ammonium paratungstate (APT) and subsequently formulating APT to metal tungsten powder and tungsten carbide powder. Other specialty products that were produced included: tungsten carbide powder for plasma spraying; tungsten titanium carbide powder; tantalum carbide powder; tungsten spray powder; crystalline tungsten powder; and molybdenum spray powder.

Based on available information, a variety of extraction processes (or treatments) were used to separate the various accessory metals (or impurities) from the tungsten depending upon the specific type of ore or concentrate that was imported. The smelting was generally conducted in relatively small batches, to permit any individual or combination of extraction treatments. Typical treatments in the smelting process included physical, chemical and mechanical processes such as: sizing and crushing; gravity, magnetic and electrostatic

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TABLE 2-1
CHRONOLOGY OF EVENTS AND SITE INVESTIGATIONS
Li Tungsten Site
Glen Cove, New York

DATE	EVENT
1940	National Reconditioning Corporation was formed by K. C. Li with the express purpose of building the Glen Cove facility.
1942	Facility becomes operational. Operation consisted of processing raw ore and scrap tungsten concentrates to produce ammonium paratungstate (APT) and subsequently formulating APT to metal tungsten powder and tungsten carbide powder. Other specialty products including tungsten carbide powder plus cobalt and other material for plasma spraying; tungsten titanium carbide powder; tantalum carbide powder; tungsten spray powder; crystalline tungsten powder; and molybdenum spray powder were also produced.
1948	National Reconditioning Corporation changes its name to Wah Chang Smelting and Refining Corporation (WCSRC).
1948 - 1964	Site operated by WCSRC.
1964	WCSRC leases equipment/property to the Wah Chang Corporation (WCC) which continued to operate the facility.
April 1967 - 1972	Teledyne acquired the stock of WCC and the two companies merged. Operations at the site continued by Teledyne-Wah Chang Corporation.
1972	WCSRC formed a wholly owned subsidiary (Li Tungsten Corporation) which operated the facility until filing for bankruptcy in 1985.
1984	Property acquired by the Glen Cove Development Company (GCDC). GCDC is a general partnership duly organized and existing under the laws of the State of New York and is owned by the Old Court Holdings Company and the Old Court Joint Ventures, Inc., both of which, in turn, are wholly-owned subsidiaries of Old Court Savings and Loan, Inc., (in Receivership) located in Maryland

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TABLE 2-1 (continued)
CHRONOLOGY OF EVENTS AND SITE INVESTIGATIONS
Li Tungsten Site
Glen Cove, New York

DATE	EVENT
1984	GCDC continues to lease the site to Li Tungsten Corporation. Market for tungsten in decline.
June 1985	Li Tungsten Corporation files for bankruptcy. Manufacturing operations at the facility cease.
May 1988	RTP Environmental Associates, Inc., (Westbury, NY) completes Site Investigation Report for Campon Reality Corporation (RTP, 1988). Site investigation undertaken to evaluate environmental conditions prior to residential development. Geraghty and Miller was subcontracted to perform the hydrogeology investigation.
March 29, 1989	New York State Department of Environmental Conservation (NYSDEC) performs site inspection.
April 14-16, 1989	USEPA assumes lead enforcement role on response actions at the site. USEPA FIT2 contractor (NUS) initiates Preliminary Assessment.
July 21, 1989	Administrative Order On Consent (AOC) issued by USEPA to Glen Cove Development Corporation which specified nine (9) interim remedial actions.
September 18, 1989	USEPA FIT2 contractor (NUS) issues Preliminary Assessment Report (NUS, 1989).
April 4, 1990	Interim remedial actions completed and final report submitted (HART, 1990).
September 28, 1990	USEPA FIT2 contractor (NUS) issues Site Inspection Report (NUS, 1990).
July 1991	Li Tungsten site proposed for inclusion on the National Priorities List (NPL).
February 12, 1992	Special Notice letters were sent by USEPA to five PRPs (Teledyne, Inc.; Li Tungsten Inc.; the Glen Cove Development Corporation; Wah Chang Smelting and Refining Corporation; and Mr. John Li (son

TABLE 2-1 (continued)
CHRONOLOGY OF EVENTS AND SITE INVESTIGATIONS
Li Tungsten Site
Glen Cove, New York

DATE	EVENT
	of Mr. K. C. Li). These letters solicited the involvement of the PRPs in the investigation of the site.
August 26, 1992	Malcolm Pirnie receives work assignment to prepare RI/FS Work Plan.

Ref. 7
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separation; roasting; leaching; floatation; and fusion. A generalized flow sheet of the treatment processes is show in Figure 2-4.

Numerous aboveground wooden, steel or fiberglass tanks were used in performing some of these treatments and to store reactants (e.g., hydrochloric acid, ammonia, hydrogen) and/or intermediate compounds (e.g., APT). Many of these tanks still contain some hazardous and inorganic liquids. As the tungsten ore moved through its various processing stages, the naturally occurring radioactive isotopes of thorium, uranium, and radium became more concentrated in the residual waste or slag. There are indications that some of this slag was placed in waste piles at the ground surface and buried on site (NUS, 1989; 1990). Accessory metals which constitute the impurities that were removed during the extraction process include: antimony, arsenic, barium, bismuth, copper, cobalt, chromium, lead, manganese, mercury, molybdenum, nickel, thorium, uranium, vanadium, and zinc.

In 1948 the National Reconditioning Company changed its name to Wah Chang Smelting and Refining Corporation (WCSRC). WCSRC continued to operate the site until 1964 when they leased the equipment and property to Wah Chang Corporation (WCC). In 1966 Teledyne acquired the stock of WCC and the two companies merged. Operations at the site continued by Teledyne-Wah Chang Corporation.

In 1972 WCSRC, which had been leasing the equipment and property to Teledyne-Wah Chang Corporation, formed a wholly owned subsidiary (Li Tungsten Corporation) which continued to operate the facility. In 1984 the property was acquired by GCDC. GCDC is a general partnership duly organized and existing under the laws of the State of New York and is owned by the Old Court Holdings Company and the Old Court Joint Ventures, Inc., both of which, in turn, are wholly-owned subsidiaries of Old Court Savings and Loan, Inc., (in Receivership) located in Maryland. GCDC continued to lease the site to Li Tungsten Corporation until 1985 when Li Tungsten Corporation ceased operations at the site and filed for bankruptcy.

There is very little specific documented knowledge on waste volumes that were generated or waste disposal practices. Drummed waste is also reported to have been buried on-site in a portion of Parcel B (NUS, 1989, 1990). Liquid wastes are believed to have been disposed of through numerous subsurface drainage pipes that have been noted in the

FLOWSHEET OF WAH CHANG'S PLANT FOR CONCENTRATING TUNGSTEN

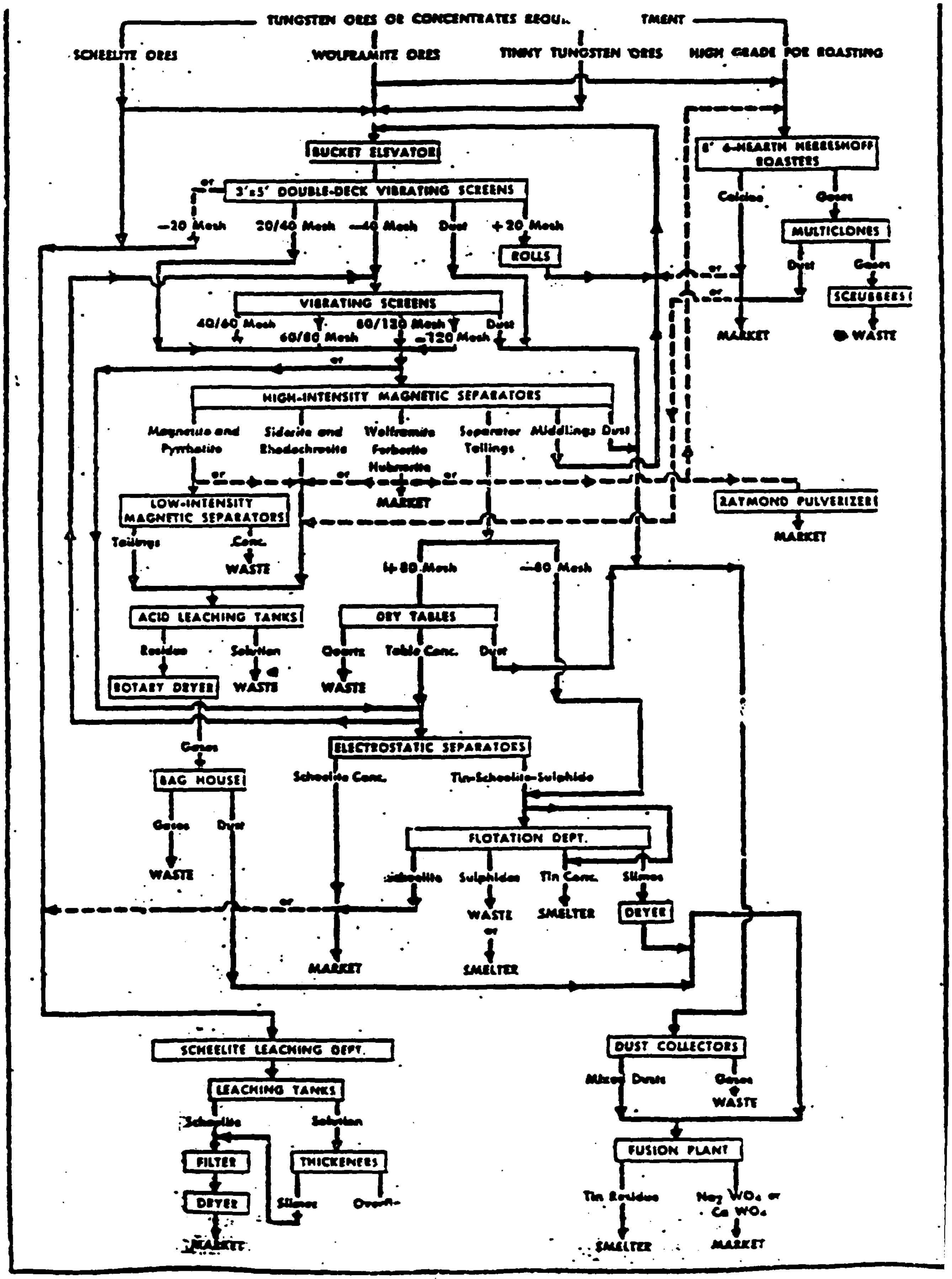

FIGURE 2-4

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bulkhead and empty directly in Glen Cove Creak. State Pollution Discharge Elimination System (SPDES) permits allowed for up to as many as 250,000 gallons per day of discharge to Glen Cove Creek. Mud Pond and the two Mud Holes were also reportedly used to dispose of liquid wastes.

On April 14, 1989 the USEPA received a request from the NYSDEC to use its Superfund authority to respond to threats posed by hazardous materials at the site. USEPA's preliminary assessment and site inspection of site conditions (NUS, 1989; 1990), revealed a large quantity of slag which was emitting low-level beta-gamma radiation. In addition, large quantities of laboratory reagents, various hazardous materials in drums and tanks, asbestos, transformers, and cylinders containing compressed liquids and gases were found in several buildings. Air monitoring showed no dangerous levels of organic compounds either on site or off-site. As a result of the conditions identified at the site, the USEPA issued an Administrative Order on Consent (AOC) to GCDC to stabilize all potential threats to the public and the environment.

Fred C. Hart Associates, Inc., (HART) was hired by GCDC to coordinate the nine (9) interim remedial actions identified in the AOC (HART, 1990). Additional removal/remedial actions were also undertaken by GCDC. A list of the interim remedial actions and the additional actions completed at the site is summarized in Table 2-2.

The Hazard Ranking Score (HRS) for the Li Tungsten site was 50.00 which is above the 28.5 threshold value for inclusion on the NPL (NUS, 1991). In July 1991 the Li Tungsten site was proposed for inclusion on the NPL and in October 1992, the site was placed on the NPL.

2.3 Current Conditions

The Li Tungsten site ceased operations in June 1985 and has been inactive since. Site security (fencing and guard) was addressed as one of the interim remedial measures in the AOC. Although a security guard is present on-site 24 hours a day, the site could be entered without knowledge of the security guard through breaks in the fence. During the site visits, observations were made that trespassing has occurred. Many of the salvageable fixtures

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TABLE 2-2
SUMMARY OF INTERIM REMEDIAL ACTIONS AND ADDITIONAL REMOVAL ACTIONS
Li Tungsten Site
Glen Cove, New York

AOC Specified Tasks

The AOC contained a schedule for completion of the nine tasks listed below. There is insufficient information available to determine exactly when these activities were completed, but generally they occurred between the date the AOC was signed on July 21, 1989 and the date the Remedial Action Report was issued on April 4, 1990.

Site Security

- Repairs were made to all existing fences and gates. New fence was installed in two areas. All gates were made functional and fitted with locks.

Radioactive Materials

- Twelve (12) drums (or 113 cubic feet) of equipment, thorium metal and other materials (HART, 1990, p.13), plus a small furnace were removed by NDL on December 11, 1989.

- Twenty (20) yards of radioactive process ore slag was relocated to a secure area within the Dice building (HART, 1990, p.13).

Laboratory Chemicals

- Fifty-two (52) 55-gallon and 80-gallon overpacks and twenty (20) 5-gallon pails of labeled laboratory chemicals were prepared for shipment to Cycle Chem.

- Eight (8) 55-gallon drums of unknown liquid laboratory chemicals were placed in the staging area.

- One (1) 55-gallon drum of unknown solid laboratory chemicals were placed in the staging area.

Drummed Chemicals

- The liquids from approximately 150 - 200 unknown drums were bulked for removal and disposal (HART, 1990, p24).

Tank Characterization

- A total of 223 tanks were identified on the three site parcels [A - 197 tanks (112 empty); B - 6 tanks (all empty); and C - 20 tanks(14 empty)] (HART, 1990, p. 35).

- Disposal of tanks was not specified as part of IRA (HART, 1990, p.24).

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TABLE 2-2 (continued)
SUMMARY OF INTERIM REMEDIAL ACTIONS AND
ADDITIONAL REMOVAL ACTIONS
Li Tungsten Site
Glen Cove, New York

Asbestos Sampling

- Five (5) high volume air samples were collected (Carbide Building; West Dice Building; Loung Building; Dickson Warehouse; and Benbow Building) and analyzed by transmission electron microscopy (TEM) with no indication of airborne asbestos (HART, 1990, p. 57).

- Fifty-one bulk samples were collected from Parcels A and C and analyzed by polarized light microscopy (PLM). Slightly more than half of the samples (53%) reflected the presence of asbestos containing materials (ACM). Results are presented in Plate 2 (HART, 1990).

Creek Sediments

- Five (5) sediment samples were collected from Glen Cove Creek and two (2) sediment samples and two (2) sediment core samples were collected from Hempstead Harbor. No enhanced levels of radionuclides were detected in the creek or the harbor.

Transformer Characterization

- Thirty eight (38) samples were collected from transformers or other electrical equipment. Eleven (11) samples collected reflected concentrations of PCBs greater than 50 ppm; three (3) units reflected concentrations greater than 500 ppm.

- Although not specified in the AOC, transformer oils were drained from all units; some were disposed of as PCB oils, others as non-PCB oils. The carcasses of three (3) transformers were also disposed of as PCB solids (HART, 1990, p.68).

Mercury Spill Cleanup

- An area inside the Benbow Building (Parcel C) was identified as having mercury on the floor. A commercially available mercury absorbing salt was used to absorb the mercury. Portions of the subfloor conduit which contained mercury could not be cleaned up because heavy equipment that was present made the area inaccessible. The room was boarded up and labelled to indicate the presence of residual mercury.

Additional Tasks Not Specified in AOC

The additional tasks listed below were completed by GCDC and with the concurrence of USEPA either prior to issuance of the AOC or concurrent with the AOC specified tasks listed above. A separate order was issued in April 1989 for the removal of the anhydrous ammonia. In general, these tasks were completed between June 1989 and April 1990.

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TABLE 2-2 (continued)
SUMMARY OF INTERIM REMEDIAL ACTIONS AND ADDITIONAL REMOVAL ACTIONS
Li Tungsten Site
Glen Cove, New York

Pressurized Cylinders

- Twenty-six (26) cylinders were identified for removal. Twenty-four (24) of these cylinders were clearly marked with the name of the owner/distributor. The owners/distributors were contacted and the cylinders were removed.

- Two (2) cylinders remain at the site - their contents are unknown. They were scheduled for sampling and analysis in April 1990. The results of this sampling is not known.

Additional Laboratory Overpacks

- Due to the number of chemicals (over 2500 individual containers; 500 with labels) found in the laboratories, offices, storage spaces in Parcel A, strict adherence to the limitation of the interim remedial action (200 laboratory chemicals) would have left a large quantity of chemicals on-site. Additional chemicals were removed, however, some may still remain

Radioactive Slag Relocation

- Three (3) dump truck loads (approximately 20 cubic yards) of radioactive slag were moved from Parcel A (near the fence at Herb Hill Road and Garvies Point Road) to inside the West Dice Building. The slag was placed on pallets, covered with plastic, and labeled with signs indicating a radioactive hazard.

Anhydrous Ammonia Removal

- One (1) tank of anhydrous ammonia on Parcel A was emptied pursuant to a separate order issued in April 1989. The anhydrous ammonia was removed and returned to its distributor (HART, 1990, p. 69).

Methyl Ethyl Ketone Peroxide (MEKP) Removal

- One (1) pint of MEKP was removed from the refrigerator in the main office building (dark room) for disposal (HART, 1990, p. 70).

Air Sampling

- Inorganic Acid Gases - fluoride was found in excess of one field blank and was thought to be due to hydrofluoric acid found in several drums.

- Volatile Organic Compounds - not detected in significant quantities.

- Inorganics - all samples were significantly below ACGIH published Threshold Limit Values (TLVs). No difference was found between air samples collected inside the buildings and those collected outside.

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(e.g., copper wiring and piping) have been removed and general debris (e.g., washing machines, mattresses) have been left behind.

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to contain elevated radionuclide concentrations.

3.1.7 Characteristics of Chemical Contamination

Characteristics of chemical contamination on the site stem from activities associated with the production of tungsten carbide powder, tungsten wire and welding rods. To produce these products, monazite sand and tungsten ore or concentrates were smelted between the 1942 and 1985. The treatment processes used to extract tungsten metal from these materials generated a residual slag (waste ore) which tended to concentrate radioactive isotopes of uranium, thorium and radium, and other heavy metal impurities. The slag, as well as some processed and unprocessed, ore was stored on-site in wooden crates, piles, and drums. Much of this material still remains on the site and some of it is believed to have been disposed of on site (Parcels B and C).

Potential contaminants on the site include commercially prepared strong acids, strong bases, organic solvents, aqueous ammonia, mercury and cyanide which were used in the treatment processes. The acids were used for leaching of impurities out of the tungsten where mechanical separation was not effective. An on-site laboratory also existed where the tungsten product was analyzed for impurities and either sent for reprocessing or identified as a finished product. The majority of chemicals used in the laboratory were removed as part of the interim remedial actions (HART, 1990). Other organics used on the site included PCBs in transformers, and fuel oil which was stored in several tanks, including one 500,000 gallon aboveground storage tank.

Asbestos containing materials (ACM) has been found on-site in siding shingles, roof tiles, tank covers and pipe insulation. ACM has also been found on the ground at the site.

3.1.8 Sources and Distribution of Contamination

As described earlier, several investigations have been completed at the site (RTP, 1988; G&M, 1988; NDL, 1989; HART, 1990; NUS, 1989; 1990). The results of these investigations were used to prepare the following sections which summarize the current understanding of environmental conditions at the site.

The primary sources of contamination on the site include processed and partially processed tungsten ore present in drums, wooden crates, and piles located both inside and outside the buildings. Removal of these source materials is proposed in this Work Plan as an interim remedial action prior to initiating the RI field investigation. Other potential sources include; Mud Pond and two Mud Holes which were used for disposal of wastewater; the disposal area located on Parcel B; unconfirmed disposal areas on Parcel C that is devoid of vegetation; underground storage tanks (whose locations and contents are unknown), and a 500,000 gallon aboveground fuel oil tank.

Secondary sources of contamination include the on-site soil; off-site groundwater from the Mattiace property, the former Powers-Chemco property and/or a former dry cleaner; and the storm and process drains on-site and off-site. Removal of asbestos is also proposed in this Work Plan as an interim remedial action prior to initiating RI field investigation (See Section 3.7).

Chemical contamination is distributed throughout the groundwater, surface water, soils and sediments at the site. Volatile organic compounds in the groundwater may originate from off-site sources, including a former dry cleaning establishment to the east of Parcel B and the Mattiace site (NUS, 1990). No on-site source of organic contaminants has been identified. The predominant contamination attributable to on-site sources is inorganic metals. Inorganic metals are found at the majority of the groundwater sampling locations. Inorganic metals have been identified in the on-site surface water and sediment contamination, including Mud Pond, the Mud Holes, the pond and associated drainage stream on Parcel B, the standing water in the building, and open tanks.

3.1.8.1 Chemical Characteristics of Soil

This section presents a summary of the chemical characterizations of the soils based on existing data (NUS, 1990). Soil samples were collected at a total of 10 locations (S-1 through S-10) as shown on Figure 3-1. The samples were analyzed for volatile and semi-volatile organic compounds, pesticides/PCBs, and inorganic compounds (metals and non-metals).

REFERENCE 8

Ref. 8
1 of 2

Pursuant to the Labor Law and Industrial Code Rule No. 38, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect of all appropriate regulatory agencies and to any conditions specified below.

Licensee	
1. Name Wah Chang Smelting and Refining Company of America, Inc. 2. Address 63 Herb Hill Road Glen Cove, New York	3. License number 743-0464 4. Expiration date Valid until terminated 5. Reference number 1

6. Radioactive materials (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
1. Thorium 2. Thorium	1. Thorium oxide 2. Thorium nitrate	1. 2300 pounds 2. 750 pounds Total thorium not to exceed ~~15 mc~~ curies .15 Ci (see calculation) AWJ

CONDITIONS

9\. Authorized use. (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.) 1. As insulator in vacuum furnace.
2. Production of thoriated tungsten powder as step in manufacturing of welding rods.

10\. The licensee shall conduct operations involving the use of sources of radiation in compliance with the requirements of New York State Industrial Code Rule No. 38, "Radiation Protection".

11\. Any disposal of radioactive waste by the licensee by burial, through the sanitary sewer, or by other release to the environment shall be in accordance with the provisions of Part 16, New York State Sanitary Code Records of all such disposal shall be maintained by the licensee. Monitoring procedures shall be instituted where necessary to demonstrate that concentrations and quantities of radioactive material so disposed of do not exceed permissible levels.

12\. The agreement material described in Items 6, 7 and 8 above:

A. Shall be used only by or under the supervision of either A. Norra or A. Bathie

B. Shall not be used in or on human beings, in products intended for uncontrolled distribution to the general public, nor in field applications where radioactivity is released.

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

Date__________ by__________

Form CCL-6aSL (8-63)

License Number 743-0464

Reference Number: 1

C. Shall be possessed and used by the licensee in accordance with statements, representations and procedures contained in his application dated February 26, 1964, and in related documents as follows:

1. Letter to the United States Atomic Energy Commission dated February 20, 1961, signed by Allen Lau.

2. So much of Part 40, Title 10, Code of Federal Regulations as is applicable to operations of the licensee and not in conflict with Code Rule 38 or the other conditions of this license.

103601

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

Date March 19, 1964

by Nathan Solomon
Nathan Solomon, Ph.D., M.D.
Chief, Radiological Health Unit
For: Morris Kleinfeld, Director, DIH

APA:jb

Form COL-6bSL (8-63)

REFERENCE 9

1 of 2

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO
40-943
CAL:PGS

SOURCE MATERIAL LICENSE

License No. D-607

Dated: DEC 6 1957

Wah Chang Smelting & Refining Company of
America, Inc.,
Woolworth Building
New York 7, New York

Attention: Mr. Allen Lau, Ass't Treasurer

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to sixteen hundred (1600) pounds of uranium and thorium compounds during the term of this license, for use as an analytical reagent and in the manufacture of thoriated tungsten wire and columbium metal at your plant locations at Glen Cove, New York and Albany, Oregon.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire December 1, 19[illegible]

FOR THE ATOMIC ENERGY COMMISSION

[illegible]

Source Materials Section
Licensing Branch
Division of Civilian Application

CC: Document room
Formal file
Suppl. file
State Health Dep.
Inspection

Enclosure:
10 CFR 20

no. 1
2 of 2

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:
40-943
CAL:PGS

Wah Chang Smelting & Refining Company of
America, Inc.
Woolworth Building
New York 7, New York

SOURCE MATERIAL LICENSE

License No. D-607

Dated: [illegible] 1957.

Attention: Mr. Allen Lau, Ass't Treasurer

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to sixteen hundred (1600) pounds of uranium and thorium compounds during the term of this license, for use as an analytical reagent and in the manufacture of thoriated tungsten wire and columbite metal at your plant locations at Glen Cove, New York and Albany, Oregon.

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This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire [illegible]

FOR THE ATOMIC ENERGY COMMISSION

CC: Document Room
Formal File
Suppl. File
State Health Dep.
[illegible]

[illegible]
Chief, [illegible] Section
[illegible] Branch
Division of [illegible] Application

[illegible]
[illegible]

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REFERENCE 10

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RADIOLOGICAL SURVEY
PHASE II INVESTIGATION
GARVIES POINT
GLEN COVE, NEW YORK

DUPLICATE 6/5/90

Prepared by:

Fred C. Hart Associates, Inc.
470 Park Avenue South
11th Floor
New York, New York 10016

and

The NDL Organization, Inc.
P.O. Box 791
Peekskill, New York 10566

June 5, 1990

(2530n-4)

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1.0 INTRODUCTION

Environmental investigations at the Li Tungsten facility in Glen Cove, New York, have indicated that residual ore at the facility contains naturally occurring radionuclides such as thorium and uranium. These radionuclides are present in the ore naturally and were concentrated in the residual ore by the refining process. In April 1989, Fred C. Hart Associates, Inc. (HART) was notified of unsubstantiated allegations that some of the residual ore from the Li Tungsten operations may have been deposited at the nearby Garvies Point Condominium site, also in Glen Cove, while this site was operated as a municipal landfill. At the time of these allegations, HART was in the process of finalizing a Remedial Investigation Work Plan for the Garvies Point site for approval by the New York State Department of Environmental Conservation (NYSDEC).

In order to investigate these allegations, HART conducted a preliminary radiological survey (referred to as the Phase I Investigation in this document) at Garvies Point. The scope of this survey was described in the Radiological Survey Work Plan submitted to NYSDEC on June 1, 1989. The survey was conducted on a 100 by 100 foot system of grid points with a microR meter. This instrument measures real time radioactivity from the surface to a maximum depth of two feet. Samples were subsequently collected from three locations at the site where elevated readings were noted in the microR meter survey. HART prepared a report summarizing the results of the Phase I survey which was submitted to NYSDEC on November 27, 1989. For completeness, the results of the survey are also summarized in Section 2.1 in this report.

Based upon the results of the Phase I survey, a Phase II Radiological Survey was proposed by HART. The Phase II survey was designed to provide more detailed information on the horizontal and vertical extent of radionuclides at Garvies Point. The scope of the Phase II survey was outlined in the Radiological Survey Results report of November 23, 1989 and consisted of an aerial photograph review; a large area gamma ray survey on a 50 by 50 foot grid with an instrument capable of penetrating up to six feet of soil; and the excavation of trenches in background areas

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and areas of elevated gamma ray readings. The Phase II investigation was implemented at the site between January 23 and February 13, 1990. The results of the survey are provided in Sections 2.2 - 2.4 of this report.

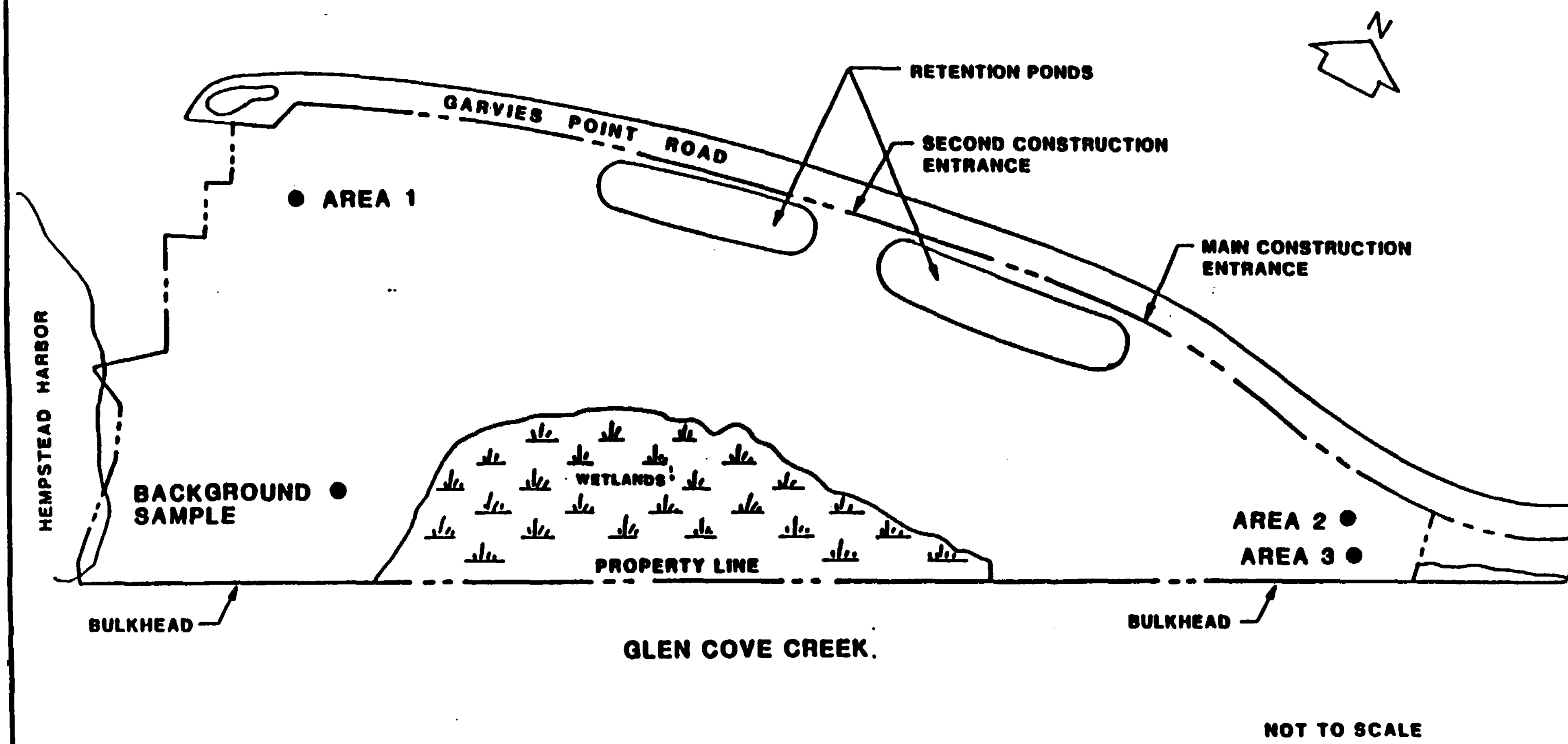
2.0 RADIOLOGICAL SURVEYS

2.1 Summary of Phase I Investigation

A field team consisting of two HART personnel and a certified health physicist performed the radiological survey on August 23, 1989. Initially, a 100 by 100 foot grid was established at the site by Baldwin and Cornelius, P.C. and HART personnel. Data was collected along the grid with two microR meters from two different manufacturers in order to verify measurements. A Geiger counter was not used because this instrument was not thought to be sensitive enough to measure the levels of radiation that were anticipated. The level of radiation was measured at each gridpoint at the ground surface and one meter above the surface. Any elevated readings between the grid points were also noted. The measurements and all relevant observations were recorded in a bound field notebook.

Agreement between the two different microR meters was excellent, indicating that the on-site measurements were accurate. Most of the site had radiation levels between 3 and 15 uR/hr as measured by the microR meters. These levels are within the normal background range of up to 20 uR/hr.

Three areas with measurements that exceeded site background were noted; the locations of these areas are shown in Figure 2-1. The area near the driveway (Area 1) had readings between 20 and 25 uR/hr. Although most of this area was covered with high grass, the highest measurements occurred in a 4 foot by 10 foot area of unvegetated soil. When digging below the surface in this area, readings up to 50 uR/hr were recorded at a depth of 6 to 18 inches. A sample for laboratory analysis was collected from this interval.



SOURCE: CDM

FIGURE 2-1

APPROXIMATE LOCATIONS OF PHASE I SAMPLES

GARVIES POINT
GLEN COVE, NY

FRED C. HART ASSOCIATES, INC.

Areas 2 and 3 were near each other but were not contiguous. Readings up to 60 uR/hr were recorded in Area 2 while Area 3 had readings up to 30 uR/hr. The elevated readings occurred in an approximately 10 foot diameter region at Area 2 and in an approximately 6 foot diameter region at Area 3. Similar to Area 1, readings increased below the surface in these two areas. A fairly discrete reddish clay-rich sand layer which had readings of 125 to 140 uR/hr was found in Area 2 at 6 to 10 inches below the surface. A sample for laboratory analysis was collected from this discrete clay layer. Readings at Area 3 increased from 30 uR/hr at the surface to 40 to 60 uR/hr about 10 inches below the surface. The entire interval was sampled for laboratory analysis.

In addition to the three samples collected from areas where above background levels of radionuclides were detected, one sample was collected at a grid point with background radiation levels for comparison. All samples were obtained by digging below the surface with a spade and filling a one liter glass jar. All samples were packaged in a cardboard box with styrofoam packing material and shipped to Recra Environmental, Inc. for analysis. The outside of the package was scanned with the microR meter at the time of shipment and no measurements above background were obtained. All soil samples were analyzed for gross alpha and gross beta radioactivity and the gamma spectrum of each sample was determined using a germanium detector.

The results of the radiological analyses are summarized in Table 2-1. The levels of radioactivity measured in the samples correlated qualitatively with the field measurements; i.e., the background sample had the lowest levels, and Area 2 had the highest levels.

Based upon the results of the Phase I radiological survey and the soil sample analyses, a Phase II radiological survey was proposed for the site. The purpose of the Phase II survey was to further characterize the vertical and lateral extent of radioactive materials. A smaller grid configuration and a different type of survey instrument were used to provide more detailed data. The Phase II survey included three tasks: an aerial photograph review, a large area gamma ray survey and a subsurface investigation.

TABLE 2-1

GARVIES POINT PHASE I RADIOLOGICAL SURVEY
ANALYTICAL RESULTS

Sample	Depth	Field Measurements (uR/hr)	Gross Alpha (PCi/g)	Gross Beta (PCi/g)	Gamma Spectra (pCi/g) Tl-208	Pb-212	Bi-212	Pb-214	Bi-214	K-40	Ac-228	Th-227	Th-234	U-235
Background	Surface	3-15	4.8±2.8	12±4	0.5±0.1	1.1±0.2	1.3±0.2	1.2±0.2	1.1±0.2	15±2	2.8±0.3	0.8±0.3	2.8±0.8	0.3±0.[illegible]
Area 1	6-8 in	50	25±6	28± 5	1.9±0.2	4.9±0.5	8.7±0.9	10±1	8.0±0.8	15±2	13±2	2.6±0.7	19±2	1.2±0.[illegible]
Area 2	6-10 in	125-140	580±60	520±60	80±8	210±30	140±20	51±6	44±6	28±3	490±50	10±1	250±30	7.0±0.[illegible]
Area 3	0-10 in	30-60	200±20	140±20	8.4±0.9	23±3	15±2	51±6	41±5	16±3	51±6	12±2	100±10	7.1±0.[illegible]

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2.2 Phase II Aerial Photograph Review

2.2.1 Objective. The photographs were reviewed in order to determine the extent of landfilling at the site. This information was used to decide which areas of the site were to be investigated in greater detail during the large area gamma ray detector survey and trenching tasks.

2.2.2 Site History. The aerial photographs can be grouped into three periods, each of which is characterized by a different use of the Garvies Point Site. The earliest period is shown in the photographs taken in 1950 and 1955. During this time, the site was relatively dormant. Small boats and a building are visible near the southwest part of the site. There are several small trenches which appear to have been installed to facilitate drainage to Glen Cove Creek. Overall, the topography of the site does not appear to have been significantly altered by landfilling or other site activities. Although the U.S. Army Corps of Engineers (USACE) dredged Glen Cove Creek in 1933, 1934, and 1948, available records do not state whether this material was disposed at the site or elsewhere.

The first aerial photograph in which landfilling activities at Garvies Point are apparent is the 1962 photograph. However, since there are no aerial photographs from the period between 1955 and 1962, it is possible that landfilling activities started prior to 1962. Landfilling activities are also apparent in the photographs taken in 1966, 1969 and 1972. The most obvious change is the filling of a tidal embayment in the eastern part of the site. Other filling took place in the center of the site immediately north of the tidal flat, and east of the beach at the western end of the site. Dredge spoils from Glen Cove Creek are known to have been disposed of at the site by USACE in 1960 and 1965. The bulkhead at the mouth of Glen Cove Creek at the western end of the site was built between 1966 and 1969, although it may not have been its present height at that time. A photograph taken in 1978 appears to represent a period during which landfilling activities had stopped and vegetation was allowed to grow.

The most recent period of use is characterized by preparation for, and the start of, development of the site for use as a residential area. This use is illustrated in the photographs taken in 1984, 1986 and 1989. During this time, the major site features which are visible today were built. These include the sales office and driveway, surface water retention ponds, and the bulkhead and partially completed buildings at the eastern end of the site.

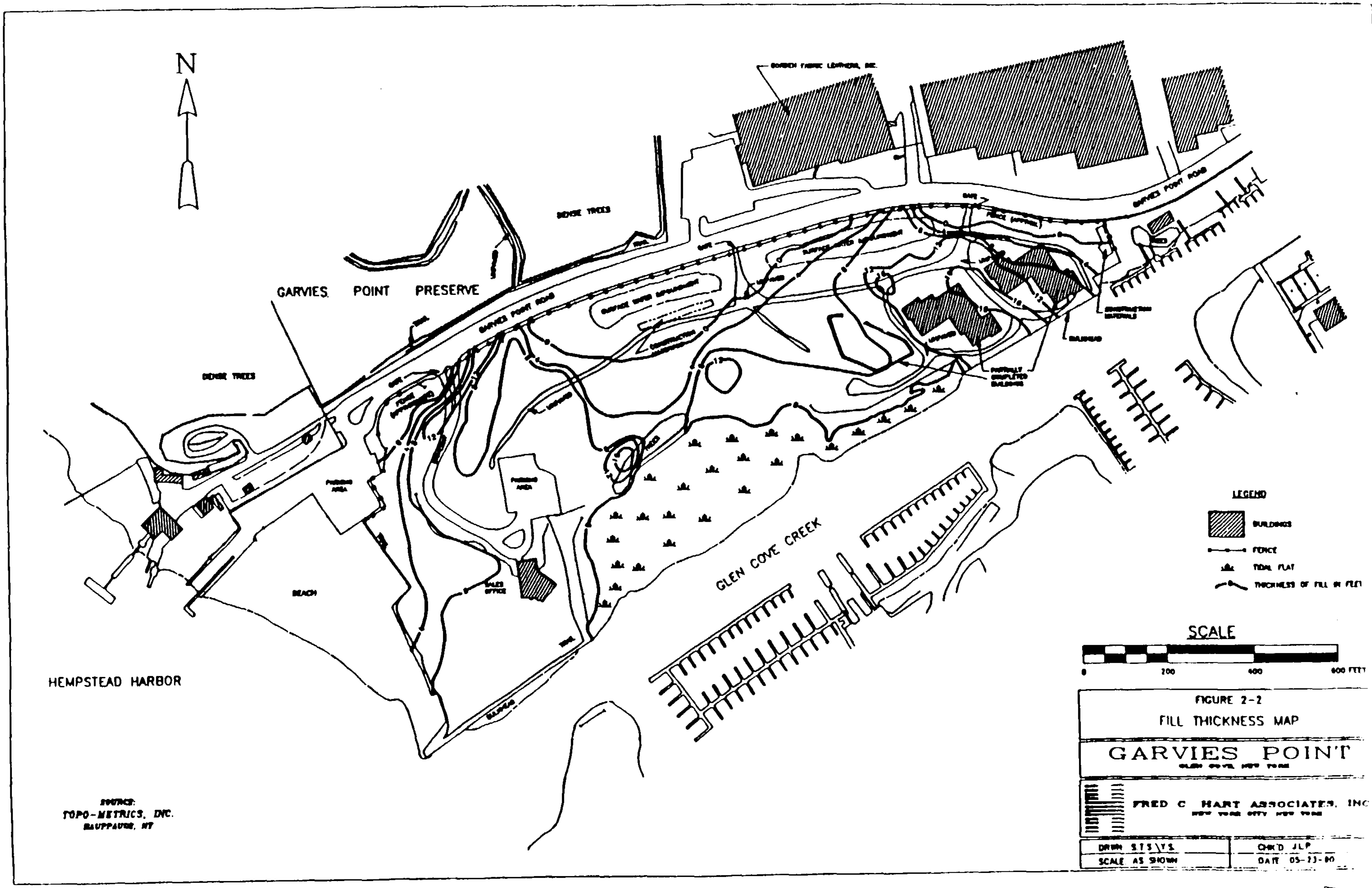
2.2.3 Fill Distribution and Thickness. The extent and thickness of the fill at Garvies Point can be estimated by comparing the present topography of the site with the topography of the site prior to landfilling. For purposes of this study, the aerial photograph taken in 1950 was assumed to represent the original site topography. The present topography is shown in a topographic map made from the aerial photograph taken in 1989. An estimate of the fill thickness based on these data is shown in Figure 2-2.

Because there are few points on the 1950 aerial photograph with known elevations, the fill thicknesses shown in Figure 2-2 are approximate. Furthermore, there is no distinction in the figure between different fill materials or different periods of landfilling activities. Given these qualifiers, it is still clear that much of the site has been landfilled. Fill materials are thickest in the former area of the tidal embayment on the eastern end of the site, where they reach approximately 16 feet in thickness. The tidal flat and some areas along Garvies Point Road have not been filled.

2.3 Phase II Large Area Gamma Ray Survey

2.3.1 Objective. As the depth penetration of the microR meter used in the first survey was only one to two feet and fill thicknesses were thought to be 10 to 15 feet, the large area gamma ray survey was conducted to determine whether or not above background levels of radiation existed at depths of up to six feet below the surface. The results of this survey were also used in the selection of trench locations in areas of elevated gamma ray fluxes and in background locations.

2.3.2 Methodologies. The large area gamma ray survey took place from January 23 to February 8, 1990. The survey was performed by the NDL



N
GARVIES POINT PRESERVE
GARVIES POINT ROAD
DENSE TREES
BEACH
PARKING AREA
SALES OFFICE
GLEN COVE CREEK
HEMPSTEAD HARBOR
LEGEND
BUILDINGS
FENCE
TIDAL FLAT
THICKNESS OF FILL IN FEET
SCALE
0
200
400
600 FEET
SOURCE:
TOPO-METRICS, INC.
HAUPPAUGE, NY
FIGURE 2-2
FILL THICKNESS MAP
GARVIES POINT
FRED C. HART ASSOCIATES, INC.
DRWN STS\YS
CHK'D JLP
SCALE AS SHOWN
DATE 05-23-90

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Organization, Inc. (NDL) of Peekskill, NY and was overseen by HART personnel. The large area gamma ray detector used in the survey was built by Ted Rahon of NDL.

The gamma ray detector consisted of an eight inch diameter, two inch thick, Cesium Iodide (CsI) scintillation crystal. It has been termed "large area" because of its 50 square inch face (324 sq.cm.) as opposed to the usual 0.2 to 0.8 square inch face of Sodium Iodide (NaI) detectors used in microR meters. The two inch crystal thickness and the higher gamma ray absorption coefficient of CsI make the detector more sensitive to high energy gamma rays than a microR meter. A single channel analyzer was used with the detector so that only gamma rays in the 2.6 MeV energy region were counted. The analyzer threshold was set so that the system did not respond to Cs-137 (0.662 MeV) or Ra-226 (0.609 MeV, 1.76 MeV) fields. This threshold setting made the detector effectively unresponsive to all naturally occurring radionuclides except Tl-208 (2.6 MeV). Even if the overlying "clean" soil had elevated U-238 series or K-40 concentrations, it would not effect the sensitivity of the system to detect the Tl-208 gamma ray.

The upper level discriminator of the analyzer was used to reduce detector background from cosmic radiation. The upper level was set such that the count rate from a natural thorium source was not significantly affected by opening or closing the window. However, the high energy background (>3 MeV), due mainly to cosmic rays, was substantially reduced. To limit counting error, sufficient counts at each location were collected to yield less than a 5% error. Thus, the counting period used at each grid location was determined by the count rates encountered. Counting periods ranged from 2 minutes at grid points with elevated gamma ray counts to 10 minutes at the background grid points.

Measurements on undisturbed, native Garvies Point soil indicated that indigenous thorium concentrations were very low and would provide the desired low background for the survey. With these background conditions and the instrument setup described above, a truck-load size mass of tungsten ore with a natural thorium concentration of 100 pCi/g could be

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detected under 1 to 2 meters of soil with a density of 1 to 1.5 g/cc (see calculations in Appendix A). The large area gamma ray detector was tested at New York University Medical Center AJ Lanza Laboratories using a National Bureau of Standards natural thorium source and sand as an attenuator prior to performing the survey at Garvies Point.

The gamma ray survey at the site was conducted on a 50 foot by 50 foot grid, offset by 25 feet from the grid stakes. This grid configuration was used to avoid retesting areas surveyed with the microR meter in the Phase I investigation. At each survey location, the grid point, gamma ray count and length of time the detector was run were recorded in a bound field notebook. As a result of buildings or surface water, several grid locations were offset to make them accessible.

2.3.3 Results. The data collected from the large area gamma ray survey is summarized in Table 2-2. In the field, the number of counts per minute (cpm) was recorded for each location. The criteria used to determine if a reading should be classified as "elevated" was two standard deviations above the local background. This criteria was selected because it ensured that 95% of the data selected would be above background and it minimized the chances of missing areas that were truly above background. Only a few of the gamma ray readings fell between two and three standard deviations of background, so the move conservative criteria of two standard deviations was applied. After 40 to 50 points in one section of the property were measured, the mean and standard deviation were calculated for readings collected from locations thought to be free of radioactive material. For example, the first 40 points measured on the western side of the property, excluding Area 1, resulted in a mean count rate of 125 cpm and a standard deviation of 24 cpm. Thus, the background level for the west side was 173 cpm (125+2x24). The background levels in both the middle and eastern sections of the property were approximately 145 cpm. A total of 25 grid points exceeded the background levels defined as local background plus two standard deviations. A list of these grid points is shown in Table 2-3 and the locations of these points are shown in Figure 2-3.

TABLE 2-2

LARGE AREA GAMMA RAY SURVEY RESULTS

JANUARY 23 - FEBRUARY 8, 1990

Location	Counts Per Minute	uR/hr	Location	Counts Per Minute	uR/hr
Z-10, 1	111± 5	5	Z+25, 1	125± 4	6
Z+75, 1+25	127± 4	6	Z+75, 1+75	104± 3	6
Z+75, 2+25	194± 4*	8	Z+75, 2+75	112± 3	7
Z+75, 3+25	98± 3	7	Z+75, 3+75	120± 3	7
Z+75, 4+25	208± 6*	9	Z+75, 4+75	106± 3	7
Z+75, 5+25	129± 4	8	Z+75, 5+75	106± 3	8
Z+75, 6+25	103± 3	7	Z+75, 6+75	118± 3	8
A+25, 1+25	114± 3	6	A+25, 1+75	106± 3	7
A+25, 2+25	126± 4	7	A+25, 2+75	132± 4	7
A+25, 3+25	126± 3	7	A+25, 3+75	120± 3	8
A+25, 4+0	140± 4	8	A+25, 4+75	118± 3	8
A+25, 5+25	122± 3	9	A+25, 5+75	148± 4	10
A+25, 6+25	139± 4	11	A+25, 6+75	131± 4	9
A+25, 7+25	133± 4	9	A+25, 7+75	196± 6*	14
A+75, 1+25	126± 4	7	A+75, 1+75	135± 4	7
A+75, 2+25	114± 3	7	A+75, 2+75	129± 4	7
A+75, 3+25	130± 4	8	A+75, 4+0	164± 4	11
A+75, 4+25	145± 4	9	A+75, 4+75	126± 4	9
A+75, 5+25	115± 3	8	A+75, 5+75	96± 3	6
A+75, 6+25	96± 3	6	A+75, 6+85	158± 4*	10
A+75, 7+25	225± 7*	14	A+75, 7+75	328± 8*	22

* Values exceeding background plus 2 standard deviations.

(2529n-11)

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TABLE 2-2
(CONTINUED)

LARGE AREA GAMMA RAY SURVEY RESULTS

JANUARY 23 - FEBRUARY 8, 1990

Location	Counts Per Minute	uR/hr	Location	Counts Per Minute	uR/hr
A+75, 7+75	488±10*	35	A+75, 8+25	144± 5*	9
B+25, 1+25	116± 3	7	B+25, 1+75	106± 3	6
B+25, 2+25	118± 3	7	B+25, 2+75	118± 3	8
B+25, 3+25	125± 4	8	B+25, 3+50	127± 4	8
B+25, 4+25	130± 4	9	B+25, 4+75	143± 4	10
B+25, 5+25	113± 3	8	B+25, 5+75	114± 3	8
B+25, 6+25	129± 4	9	B+25, 6+75	84± 3	6
B+25, 7+25	258± 7*	13	B+25, 7+75	298± 8*	14
B+25, 8+25	149± 4*	9	B+75, 1+25	120± 3	6
B+75, 1+75	112± 3	7	B+75, 2+25	104± 3	7
B+75, 2+75	100± 3	7	B+75, 3+25	97± 3	7
B+75, 3+75	115± 3	8	B+75, 4+25	85± 3	6
B+75, 4+75	110± 3	9	B+75, 5+25	111± 3	7.5
B+75, 5+75	105± 3	8	B+75, 6+25	120± 3	8
B+75, 6+75	157± 4*	11	B+75, 7+25	85± 3	7
B+75, 7+75	74± 3	7	C+25, 1+25	98± 3	7
C+25, 1+75	90± 3	6	C+25, 2+25	96± 3	8
C+25, 3+75	96± 3	7	C+25, 4+25	132± 4	9
C+25, 4+75	104± 3	7	C+25, 5+25	135± 4	8
C+25, 5+75	133± 4	7.5	C+25, 6+25	99± 3	8
C+25, 6+75	117± 3	9	C+25, 7+25	128± 4	10

* Values exceeding background plus 2 standard deviations.

(2529n-12)

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TABLE 2-2
(CONTINUED)

LARGE AREA GAMMA RAY SURVEY RESULTS

JANUARY 23 - FEBRUARY 8, 1990

Location	Counts Per Minute	μR/hr	Location	Counts Per Minute	μR/hr
C+25, 7+75	111± 3	11	C+75, 1+25	102± 3	6.5
C+75, 1+75	103± 3	7	C+75, 2+25	99± 3	6
C+75, 2+75	89± 3	6	C+75, 3+25	106± 3	7
C+75, 3+75	136± 4	8	C+75, 4+25	81± 3	5
C+75, 4+75	80± 3	5	C+75, 5+25	81± 3	5.5
C+75, 5+75	135± 4	9.5	C+75, 6+25	116± 3	8
C+75, 6+75	132± 4	9.5	C+75, 7+25	155± 4*	10
C+75, 7+75	140± 4	9	C+75, 8+25	118± 3	7
D+25, 1+25	Water	-	D+25, 1+75	98± 3	6
D+25, 2+25	91± 3	6	D+25, 2+75	89± 3	6
D+25, 3+25	90± 3	7	D+25, 3+75	90± 3	6
D+25, 4+25	66± 3	6	D+25, 4+75	72± 3	5
D+25, 5+25	91± 3	5.5	D+25, 5+75	115± 3	7
D+25, 6+25	116± 3	8	D+25, 6+75	132± 4	8
D+25, 7+75	145± 4	8	D+25, 8+15	134± 4	9
D+75, 8+15	132± 4	9	D+75, 7+75	126± 4	8.5
D+75, 7+25	96± 3	6.5	D+75, 6+75	93± 3	6.5
D+75, 6+25	108± 3	7.5	D+75, 5+75	89± 3	6.0
D+75, 4+75	98± 3	8.5	D+75, 4+25	88± 3	6
D+75, 5+25	82± 3	6	E+25, 4+25	84± 3	5
E+25, 4+75	85± 3	6	E+25, 5+25	97± 3	6

* Values exceeding background plus 2 standard deviations.
(2529n-13)

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TABLE 2-2
(CONTINUED)

LARGE AREA GAMMA RAY SURVEY RESULTS

JANUARY 23 - FEBRUARY 8, 1990

Location	Counts Per Minute	uR/hr	Location	Counts Per Minute	uR/hr
E+25, 5+75	97± 3	6	E+25, 6+25	102± 3	7
E+25, 6+75	111± 3	8	E+25, 7+25	103± 3	8
E+25, 7+65	128± 4	9	E+75, 7+65	128± 4	9
E+75, 7+25	102± 4	7	E+75, 6+75	98± 4	7
E+75, 6+25	88± 4	7	E+75, 5+75	93± 4	6
E+75, 5+25	77± 3	6	E+75, 4+75	87± 4	6
E+75, 4+25	110± 4	7	F+25, 4+25	139± 4	6
F+25, 4+75	114± 4	6	F+25, 5+25	114± 4	7
F+25, 5+75	103± 4	7	F+25, 6+25	112± 4	6
F+25, 6+75	135± 4	7	F+25, 7+25	151± 5*	9
F+25, 7+75	124± 4	8	F+75, 7+75	116± 4	8
F+75, 7+25	109± 4	7	F+75, 6+75	80± 3	5
F+75, 6+25	96± 4	7	F+75, 5+75	105± 4	6
F+75, 5+25	89± 4	7	F+75, 4+75	86± 3	6
F+75, 4+25	107± 4	7	G+25, 4+25	90± 4	5
G+25, 4+75	95± 4	7	G+25, 5+25	99± 4	6
G+25, 5+75	87± 4	7	G+25, 6+25	84± 3	7
G+25, 6+75	72± 3	5	G+25, 7+50	44± 2	5
G+75, 7+70	68± 3	5	G+75, 6+75	76± 3	5
G+75, 6+25	95± 4	6	G+75, 5+75	113± 4	8
G+75, 5+25	114± 4	7.5	G+75, 4+75	117± 4	7
G+75, 4+25	86± 4	6			

* Values exceeding background plus 2 standard deviations.

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TABLE 2-2
(CONTINUED)

LARGE AREA GAMMA RAY SURVEY RESULTS

JANUARY 23 - FEBRUARY 8, 1990

Location	Counts Per Minute	uR/hr	Location	Counts Per Minute	uR/hr
H+25, 7+70	65± 3	5	H+25, 6+75	52± 3	5
H+25, 6+25	94± 4	6	H+25, 5+75	114± 4	8
H+25, 5+25	126± 4	8	H+25, 4+75	109± 4	8.5
H+25, 4+25	105± 4	6	H+75, 7+70	66± 3	4.5
H+75, 6+75	66± 3	5	H+75, 5+75	93± 4	7
H+75, 5+25	114± 4	7	H+75, 4+75	92± 4	7
H+75, 4+25	92± 4	6.5	H+75, 3+75	102± 4	6.5
I+25, 7+70	70± 3	4.5	I+25, 6+75	69± 3	5
I+25, 5+75	98± 4	7	I+25, 5+25	114± 4	7
I+25, 4+75	111± 4	7	I+25, 4+25	111± 4	8
I+25, 3+75	101± 4	6.5	I+75, 7+70	84± 3	7
I+75, 5+75	105± 4	6	I+75, 4+75	99± 4	7.5
I+75, 4+25	135± 4	8	I+75, 3+75	117± 4	9
I+75, 3+25	99± 4	8	J+25, 3+75	86± 3	7
J+25, 3+25	107± 4	8	J+25, 4+75	91± 4	6
J+25, 4+25	102± 4	7.5	J+75, 6+15	84± 3	6
J+25, 5+25	106± 4	7.5	J+25, 5+75	100± 4	7
J+25, 6+25	90± 4	6.5	J+25, 6+60	132± 4	8
J+75, 5+75	73± 3	4	J+75, 5+25	72± 2	4
J+75, 4+75	162± 5*	9	J+75, 4+25	85± 3	6
J+75, 3+75	74± 3	5			

* Values exceeding background plus 2 standard deviations.

(2529n-15)

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TABLE 2-2
(CONTINUED)

LARGE AREA GAMMA RAY SURVEY RESULTS

JANUARY 23 - FEBRUARY 8, 1990

Location	Counts Per Minute	uR/hr	Location	Counts Per Minute	uR/hr
M+25, 2+75	118± 4	8	M+25, 3+25	141± 8*	8
M+25, 3+75	142± 5*	7.5	M+25, 4+25	106± 4	5.5
M+25, 5+25	60± 3	4	M+25, Fence	66± 3	4
M+75, Fence	60± 3	4	M+75, 5+25	64± 3	4
M+75, 4+25	115± 4	6	M+75, 3+75	126± 4	6.5
M+75, 3+25	106± 4	9	M+75, 2+75	91± 4	9
M+75, 2+25	113± 4	7.5	M+75, 1+75	112± 4	7.5
N+25, 1+75	83± 3	8	N+25, 2+25	108± 4	7
N+25, 2+75	96± 4	10	N+25, 3+25	102± 4	7
N+25, 3+75	95± 4	6.5	N+25, 4+25	73± 3	5
N+25, 5+25	71± 3	5	N+25, Fence	68± 3	4
N+75, 4+75	70± 3	5	N+75, 4+25	103± 4	7.5
N+75, 3+75	88± 4	7.5	N+75, 3+25	114± 4	8
N+75, 2+75	110± 4	8	N+75, 2+25	89± 4	9.5
N+75, 1+75	94± 4	9	N+75, Bulkhead	89± 4	8
O+25, Bulkhead	104± 4	7	O+25, 1+75	123± 4	7
O+25, 2+25	118± 4	7	O+25, 2+75	107± 4	8
O+25, 3+25	107± 4	8	O+25, 3+75	96± 4	7
O+25, 4+25	143± 5	9	O+75, 3+75	112± 4	7

* Values exceeding background plus 2 standard deviations.

(2529n-17)

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TABLE 2-2
(CONTINUED)

LARGE AREA GAMMA RAY SURVEY RESULTS

JANUARY 23 - FEBRUARY 8, 1990

Location	Counts Per Minute	uR/hr	Location	Counts Per Minute	uR/hr
O+75, 3+25	118± 4	8	O+75, 2+75	62± 3	6
O+75, 2+25	137± 4	10	O+75, 1+75	131± 4	9
O+75, Bulkhead	107± 4	8	P+25, Bulkhead	129± 4	9.5
P+25, 1+75	133± 4	11	P+25, 2+25	114± 4	11
P+25, 2+75	136± 4	11.5	P+25, 3+25	108± 4	9
P+25, 3+75	99± 4	7	P+75, 3+25	214± 6*	17
P+75, 2+75	190± 5*	20	P+75, 2+25	96± 4	8
P+75, 1+75	124± 4	12	P+75, 1+25	82± 3	9
P+75, Bulkhead	87± 4	8	Q+25, 1+25	132± 4	9
Q+25, 1+50	2369± 34*	120	Q+25, 1+75	171± 9*	11.5
Q+25, 2+25	516± 16*	26	Q+25, 2+75	120± 8	7.5
Q+25, 3+10	118± 8	6.5	Q+50, 1+75	312± 12*	19
Q+75, 1+25	116± 8	5	Q+75, 1+75	130± 8	9
Q+75, 2+25	106± 7	6	R+0, 1+25	114± 8	4.5
R+0, 2+0	152± 9*	8	R+0, 2+25	138± 8*	8
R+15, 1+50	113± 8	6	R+25, 2+0	140± 8	6.5
R+25, 2+25	533± 16*	21			

* Values exceeding background plus 2 standard deviations.

TABLE 2-3

LIST OF GRID POINTS THAT EXCEED BACKGROUND LEVELS

Grid Point	Location on Map in Figure 2-3
Z+75, 2+25	Z1
Z+75, 4+25	Z2
A+75, 6+85	A
A+75, 7+25	A
A+75, 7+75	A
A+75, 8+25	A
B+25, 7+25	A
B+25, 7+75	A
B+25, 8+25	A
B+75, 6+75	B
C+75, 7+25	C
F+25, 7+25	F
J+75, 4+75	J
M+25, 3+25	M
M+25, 3+75	M
P+75, 3+25	P
P+75, 2+25	P
Q+25, 1+50	Q
Q+25, 1+75	Q
Q+25, 2+25	Q
Q+50, 1+75	Q
R+10, 2+0	R
R+0, 2+25	R
R+25, 2+25	R

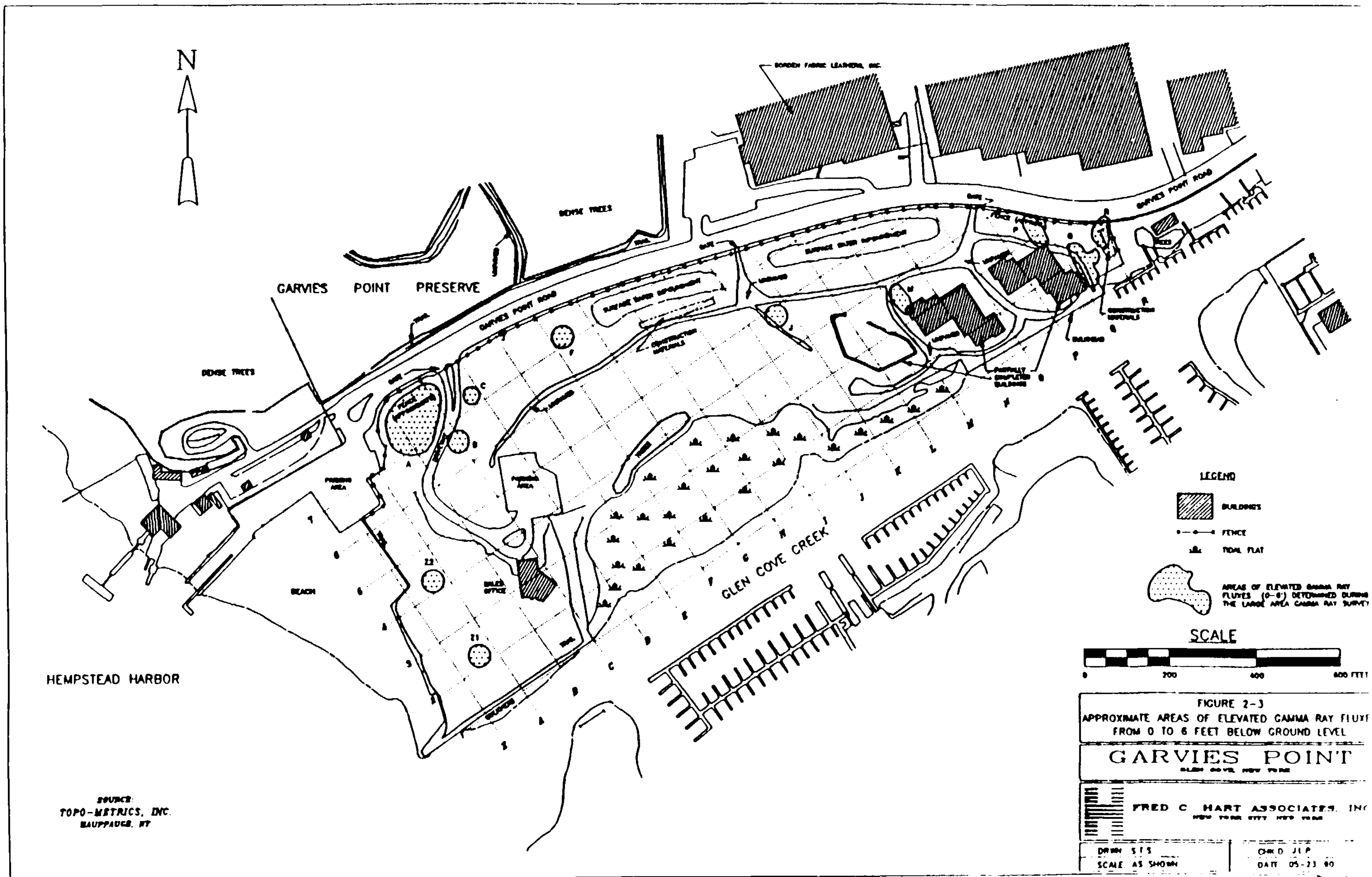

FIGURE 2-3
APPROXIMATE AREAS OF ELEVATED GAMMA RAY FLUXES
FROM 0 TO 6 FEET BELOW GROUND LEVEL

GARVIES POINT

FRED C HART ASSOCIATES, INC

DRWN STS
SCALE AS SHOWN
CHK'D JLP
DATE 05-23-90

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During the investigation, there was some concern that the results of the large area gamma ray detector survey could be affected by encountering soil densities of greater than 1.5 g/cc such as in areas where stone or concrete might have been dumped. An increase in soil density would reduce the effective depth of ore detection to less than 1 meter. Fortunately, concrete and stone were observed in only a few locations. Soil densities were estimated from the weights of the radionuclide samples collected and were found to range from 0.7 to 1.3. Thus, the estimated depth of detection of 1 to 2 meters was valid throughout the majority of the property. Actual ore layers were detected by the gamma spectrometer at depths of up to four feet at locations where microR meters showed only background levels.

2.4 Phase II Subsurface Investigation

2.4.1 Objective. The purpose of the subsurface investigation was to allow a visual inspection of the composition and depth of the fill material in areas of both elevated gamma ray fluxes and in background areas. Soil samples were collected for laboratory analysis to measure the range of radionuclide concentrations in the soils.

2.4.2 Methodologies. The trenching activities took place between February 9 and 13, 1990. All trenches were dug by Direct Environmental, Inc. of West Babylon, New York, using a JD 590 Trachoe and were overseen by HART and NDL personnel.

Fifteen trenches were dug in the areas of elevated gamma ray fluxes and an additional five trenches were dug at locations where background gamma ray fluxes were measured. The locations of the trenches are shown in Figure 2-4 and Table 2-4 shows the correlation between trench locations and the 25 areas of elevated gamma ray fluxes noted on Table 2-3. The trenches were approximately 3 feet wide by 5 to 15 feet in depth and up to 50 feet in length. Trench logs were filled out at each trench location by a HART geologist. Information noted on the logs included trench location and identification number, the start and finish dates, the condition and composition of the trench walls, the sample collection depths, air

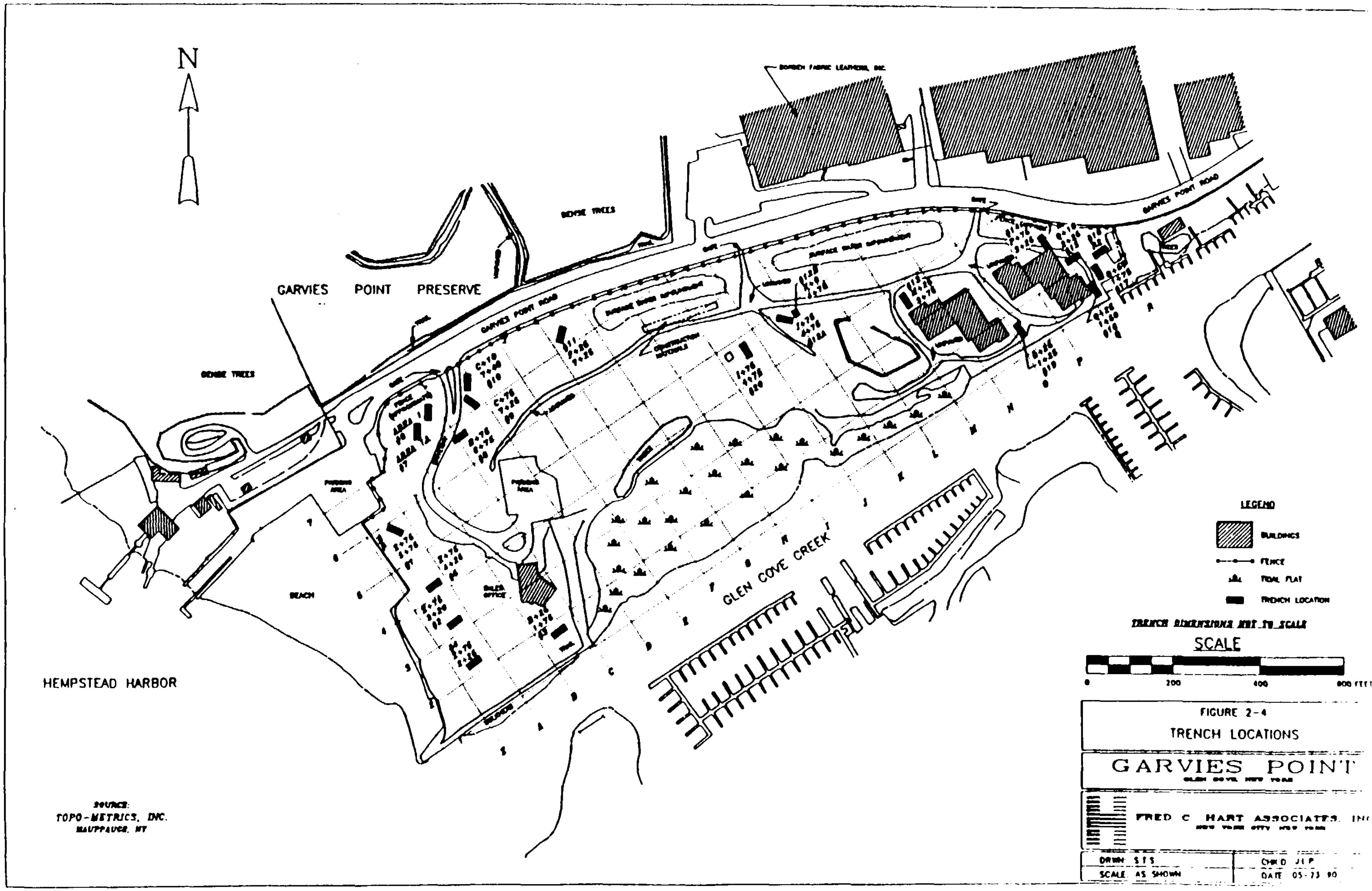
N
GARVIES POINT PRESERVE
GARVIES POINT ROAD
DENSE TREES
BEACH
GLEN COVE CREEK
HEMPSTEAD HARBOR
LEGEND
BUILDINGS
FENCE
TIDAL FLAT
TRENCH LOCATION
TRENCH DIMENSIONS NOT TO SCALE
SCALE
0
200
400
600 FEET
SOURCE:
TOPO-METRICS, INC.
MAUPPAUGE, NY
FIGURE 2-4
TRENCH LOCATIONS
GARVIES POINT
GLEN COVE, NEW YORK
FRED C. HART ASSOCIATES, INC
NEW YORK CITY, NEW YORK
DRWN: STS
CHKD: JLP
SCALE: AS SHOWN
DATE: 05-23-90

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TABLE 2-4

CORRELATION BETWEEN GAMMA RAY FLUX MEASUREMENTS AND TRENCH LOCATIONS

Grid Points at which at which Elevated Gamma Ray Fluxes Were Noted	Location	NDL Trench Number and Coordiates of Trenches Excavated for Subsurface Investigation
-	Background	Number 1, Z+75, 5+75
-	Background	Number 2, Z+75, 3+20
-	Background	Number 3, B+25, 1+25
Z+75, 2+25	Z1	Number 4, Z+75, 2+25
Z+75, 4+25	Z2	Number 5, Z+75, 4+25
A+75, 6+85	A	Number 6, Area 1, B+10, 7+75
A+75, 7+25	A	Number 7, Area 1A, A+75, 6+85
A+75, 7+75	A	
A+75, 8+25	A	
B+25, 7+75	A	
B+25, 7+75	A	
B+25, 8+25	A	
B+75, 6+75	B	Number 8, B+75, 6+75
C+75, 7+75	C	Number 9, C+75, 7+25 to 7+75
	C	Number 10, C+10, 7+40
F+25, 7+25	F	Number 11, F+25, 7+25
J+75, 4+75	J	Number 12A, J+75, 4+75
	J	Number 12B, K+0, 4+75
M+25, 3+25	M	Number 13, M+25, 3+75
M+25, 3+75	M	
P+75, 3+25	P	Number 14, P+75, 3+25
P+75, 2+75	P	
Q+25, 2+25	Q	Number 15, Q+10, 2+25
Q+25, 1+50	Q	Number 16, Q+25, 1+50
Q+25, 1+75	Q	
Q+50, 1+75	Q	Number 17, Q+50, 1+75
R+0, 2+10	R	Number 18, R2 (R+0, 2+0)
R+10, 2+25	R	
R+25, 2+25	R	
-	Background	Number 19, O+25, 1+25
-	Background	Number 20, 1+75, 4+25

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monitoring readings, and the length and depth of each trench. The logs are contained in Appendix B.

During trenching activities, the work zone was monitored with a microR meter, a particulate dust monitor (PDM), a photoionization detector (PID or HnU unit) and a combustible gas indicator (CGI). Drager Tubes for vinyl chloride monitoring were available on-site in the event organic vapor concentrations exceeded three parts per million (ppm) for one minute. Five air monitoring stations were set up around the site to monitor airborne particulates in the vicinity of the work area. Two stations were set up upwind and three stations were situated downwind of the trenching activities. All work was performed in Level C protective gear in order to prevent contact with or inhalation of radionuclides in soil.

Samples were obtained by a HART geologist by collecting soil from the appropriate interval directly from the bucket of the trachoe. The instability of the trench walls made it impossible for HART personnel to enter the pits. The trachoe operator cleared away soil that fell into the trench from the sidewalls and collected a soil sample from an undisturbed location on the bottom of the trench. Soil samples were collected at two foot intervals in each trench using this technique. Each sample was properly identified, packed in coolers and documented under full chain-of-custody procedures. The samples were directly relinquished to the NDL health physicist. All samples were analyzed by the NDL Organization, Inc. of Peekskill, NY, which participates in the EPA-NV quality assurance program.

After each trench was examined, logged and sampled, the large area gamma ray detector was lowered into the trench if it was not readily apparent that elevated gamma ray fluxes were present. The detector was not lowered into any trenches known to have elevated gamma ray fluxes. By lowering the detector to the trench bottom at six to eight feet below ground level, gamma ray fluxes at depths between six feet and native soil could be measured. In this way, it was possible to evalute gamma ray fluxes through the entire thickness of the fill. The trenches were backfilled with soil, to the best extent possible, in the order in which the soils were excavated. After backfilling, the filled areas were surveyed for any exposed ore. The trachoe was surveyed for contamination each day and underwent decontamination at the Li Tungsten site at the completion of trenching activities.

2.4.3 Results. A total of 66 soil samples from the trenches were analyzed on an intrinsic germanium detector with a computer-based multichannel analyzer by the NDL Organization, Inc. Spectral data was reduced to radionuclide concentrations by the use of a gamma ray spectrum analysis program, the Oak Ridge National Laboratory "FUEL" gamma library, and a National Bureau of Standards mixed gamma calibration source prepared in the same geometry as the Garvies Point samples. A summary of the sampling results is shown in Table 2-6. No samples were collected from the background trenches 1,3, or 20 or from trenches 5 and 10. No samples were collected from trench 10 because the fill material encountered was difficult to sample; the lack of samples from trench 5 was an oversight. A copy of NDL's sampling report is contained in Appendix C.

The concentrations of thorium generally ranged from below the detection limit to about 28.5 pCi/g. One anomalously high concentration of thorium of 583 pCi/g was detected near the driveway at a depth of four to six feet in Area 1. Anomalously high concentrations of uranium and Ra-226 were also found in this sample from Area 1 at four to six feet. In the remaining samples, uranium concentrations ranged from below detection to about 57.3 pCi/g, and Ra-226 readings ranged from below detection to about 54.5 pCi/g.

The four upwind and four downwind air samples were analyzed and showed no detectable levels of radioactivity (<4 x 10^{-13} uCi/ml).

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TABLE 2-5

SUMMARY OF RADIONUCLIDE CONCENTRATIONS IN TRENCH SAMPLES

NDL No.	Trench Location	Sample Depth (feet)	NDL Sample Number	Th-nat pCi/g	U-nat pCi/g	Ra-226 pCi/g
2.	Z+75, 3+20	0	10	1.1	<3.9	1.1
		2	64	0.9	<2.9	0.9
		4	7	<0.9	<2.9	0.5
		6	56	<0.8	<1.3	0.4
		8	55	<0.7	<2.3	0.3
4.	Z+75, 2+25	0	19	<1.4	<3.1	0.6
		2	20	0.6	<2.1	0.6
		4	8	0.6	<1.4	0.3
		6	18	<1.3	<1.9	0.5
		8	9	<0.6	<1.4	0.4
6.	Area 1 (B+10, 7+75)	0	13	0.9	<3.4	0.9
		2	58	0.6	<2.9	0.7
		4	54	583	662	772
		6	4	1.1	52.8	2.7
		10	65	4.1	<6.1	3.1
7.	Area 1A (A+75, 6+85)	0	52	2.6	<5.9	3.7
		2	16	3.3	<6.3	3.4
		4	1	28.5	49.7	47.4
		6	11	0.5	<1.5	<0.3
8.	B+75, 6+75	0	61	0.7	<3.0	0.4
		2	5	<0.6	<2.3	0.4
		4	57	28.1	44.5	41.3
		6	14	19.3	18.8	26.4
		8	62	4.5	6.9	6.8
		12-16	59	11.6	13.9	17.8
9.	C+75, 7+25 to 75	0	17	0.8	<2.1	0.6
		2	60	0.8	<2.0	0.8
		4	63	1.8	<2.1	1.2
		6	66	<1.1	<2.0	0.5
		8	22	3.0	<8.3	4.2
10.	C+10, 7+40	4	15	4.0	<10.9	6.6
11.	F+25, 7+25	0	23	<0.9	<1.5	0.4
		2	3	1.1	<2.7	0.6
		6	2	2.1	<1.9	1.1

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TABLE 2-5

SUMMARY OF RADIONUCLIDE CONCENTRATIONS
IN TEST PIT SAMPLES
(CONTINUED)

NDL No.	Trench Location	Sample Depth (feet)	NDL Sample Number	Th-nat pCi/g	U-nat pCi/g	Ra-226 pCi/g
12A.	J+75, 4+75	0	6	0.4	<2.5	0.5
		2	53	0.8	<1.4	0.6
		6	21	0.7	<3.3	0.4
13.	M+25, 3+75	0	26	<0.8	<1.9	<0.4
		2	12	0.8	<1.8	0.6
		4	25	<0.8	<3.8	0.4
		6	24	<0.6	<2.5	0.4
14.	P+75, 3+25	2	43	<0.7	<2.0	0.8
		4	45	0.6	<1.8	0.7
		6	46	12.4	20.8	16.9
		8	48	0.6	<2.4	0.7
		10	38	0.9	<3.0	0.6
15.	Area 3 (Q+10, 2+25)	0	39	24.4	57.3	54.5
		2	44	<0.7	<4.6	0.8
		4	42	9.5	13.7	17.6
		6	51	4.8	<9.3	6.4
16.	Area 2 (Q+25, 1+50)	0	37	2.7	<5.3	0.9
		2	36	0.7	<2.6	<0.4
		4	35	0.7	<2.8	<0.4
		6	47	1.2	<4.2	0.5
		8	50	1.3	<4.8	1.9
17.	Q+50, 1+75	0	29	4.0	<12.5	3.3
		2	34	<1.0	<3.9	0.5
		4	27	4.3	<10.0	8.3
		8	28	1.7	<6.5	4.0
		10	49	0.5	<2.6	1.0
18.	R+0, 2+0 (R stake)	0	30	0.6	<1.8	0.4
		2	33	3.9	<9.7	6.8
		6	32	2.9	<6.6	4.3
		10	41	<1.8	<3.5	1.5
19.	O+25, 1+25	6	31	4.0	<7.2	11.1
		8	40	<1.0	<1.9	0.7

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TABLE 2-5

SUMMARY OF RADIONUCLIDE CONCENTRATIONS
IN TEST PIT SAMPLES
(CONTINUED)

NDL No.	Trench Location	Sample Depth (feet)	NDL Sample Number	Th-nat pCi/g	U-nat pCi/g	Ra-226 pCi/g
12A.	J+75, 4+75	0	6	0.4	<2.5	0.5
		2	53	0.8	<1.4	0.6
		6	21	0.7	<3.3	0.4
13.	M+25, 3+75	0	26	<0.8	<1.9	<0.4
		2	12	0.8	<1.8	0.6
		4	25	<0.8	<3.8	0.4
		6	24	<0.6	<2.5	0.4
14.	P+75, 3+25	2	43	<0.7	<2.0	0.8
		4	45	0.6	<1.8	0.7
		6	46	12.4	20.8	16.9
		8	48	0.6	<2.4	0.7
		10	38	0.9	<3.0	0.6
15.	Area 3 (Q+10, 2+25)	0	39	24.4	57.3	54.5
		2	44	<0.7	<4.6	0.8
		4	42	9.5	13.7	17.6
		6	51	4.8	<9.3	6.4
16.	Area 2 (Q+25, 1+50)	0	37	2.7	<5.3	0.9
		2	36	0.7	<2.6	<0.4
		4	35	0.7	<2.8	<0.4
		6	47	1.2	<4.2	0.5
		8	50	1.3	<4.8	1.9
17.	Q+50, 1+75	0	29	4.0	<12.5	3.3
		2	34	<1.0	<3.9	0.5
		4	27	4.3	<10.0	8.3
		8	28	1.7	<6.5	4.0
		10	49	0.5	<2.6	1.0
18.	R+0, 2+0 (R stake)	0	30	0.6	<1.8	0.4
		2	33	3.9	<9.7	6.8
		6	32	2.9	<6.6	4.3
		10	41	<1.8	<3.5	1.5
19.	O+25, 1+25	6	31	4.0	<7.2	11.1
		8	40	<1.0	<1.9	0.7

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3.0 DISCUSSION

3.1 Description of Site Soils

Based on the results of the subsurface investigation, there is a significant layer of fill material overlying most of the site. The nature and content of the fill was fairly consistent throughout the site. The most common debris found in the fill material included plastic trash bags, wood, bricks, glass, metal, tires, concrete and paper. At locations Z+75, 2+75 and M+25, 3+75 what appeared to be bluish-purple paint and dye waste was observed. On the eastern side of the site near locations Q+25, 1+50; Q+50, 1+75 and Q+10, 2+25, the fill was comprised of sandy soil with minor amounts of debris. Native soil encountered at the site was a reddish-brown medium-grained sand with gravel.

The fill appeared to be the thinnest, as expected based on the aerial photograph review, near the northern and western boundaries of the property. The fill thickness on the western boundary at grid location Z+75, 5+75 was approximately 3.5 feet. On the northern boundary, at location F+25, 7+25, no fill was observed. The native soil was not observed in any of the trenches on the eastern portion of the site even though trenches of up to 10 feet in depth were excavated. Groundwater was encountered in several trenches in the central and western portions of the site at approximately 8 to 10 feet below the surface.

3.2 Soil Quality

During the large area gamma ray detector survey, elevated gamma ray fluxes were measured at 25 grid points. Most of these grid points were located in one of two general areas of the property: around the main entrance/driveway area, and in the far eastern corner of the property. These results correlate well with the data collected during the Phase I survey. The area in the driveway encompasses the original Area 1 from the Phase I investigation and the eastern area encompasses both locations on the eastern side of the site, designated as Areas 2 and 3, at which elevated readings were detected in the Phase I survey.

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Six grid points outside of the areas designated as 1, 2 and 3 in Phase I showed elevated gamma ray fluxes during the large area gamma ray survey: Z1, Z2, F, J, M and Q+25, 1+50 (Figure 2-3). Trenches were dug at these locations to determine the source of the elevated readings. The sample results from these locations show acceptable radionuclide concentrations generally ranging from less than 1 pCi/g to 2 pCi/g. It is thought that the elevated gamma flux readings are from clean soil that was slightly enriched in thorium either as a result of natural processes or as a result of debris such as firebrick, lantern mantles, zircon process sands or small stray pieces of slag from Li Tungsten.

The sampling results from the trenches confirmed that the material containing elevated levels of radionuclides was generally found in two areas; one on the far eastern side of the property (Areas P, Q, and R) and one on the far western side near the entrance/driveway (Areas A, B, and C). It is interesting to note that the most elevated readings of thorium, uranium, and radium are found in a fairly discrete zone in both locations at about 4 to 8 feet below ground surface. In both of these areas, the elevated readings are associated with a black powder or granular material which contained concentrations of uranium and thorium series usually in the 1 to 50 pCi/g range. The physical appearance and corresponding radionuclide concentration range of this material closely matches that of the lower level tungsten ores found on Parcels A and B of the Li Tungsten property. Readings above the 4-6 foot layer tend to be close to background and in most cases, readings from below the 4-6 foot layer are close to background as well. Minor exceptions to this trend were found in trenches 8, 15 and 17. At trench 8, elevated concentrations of uranium and thorium were found at depths ranging from 4 to 16 feet. The elevated readings are directly associated with a black granular material in this trench. Slightly elevated readings in the 0-2 foot zone were found at two locations: trench 15 and trench 17 on the eastern side of the property.

An estimate of the areal extent of soils with elevated levels of radionuclides is shown in Figure 3-1. The area near the entranceway is approximately 28,750 square feet and the area in the eastern corner is

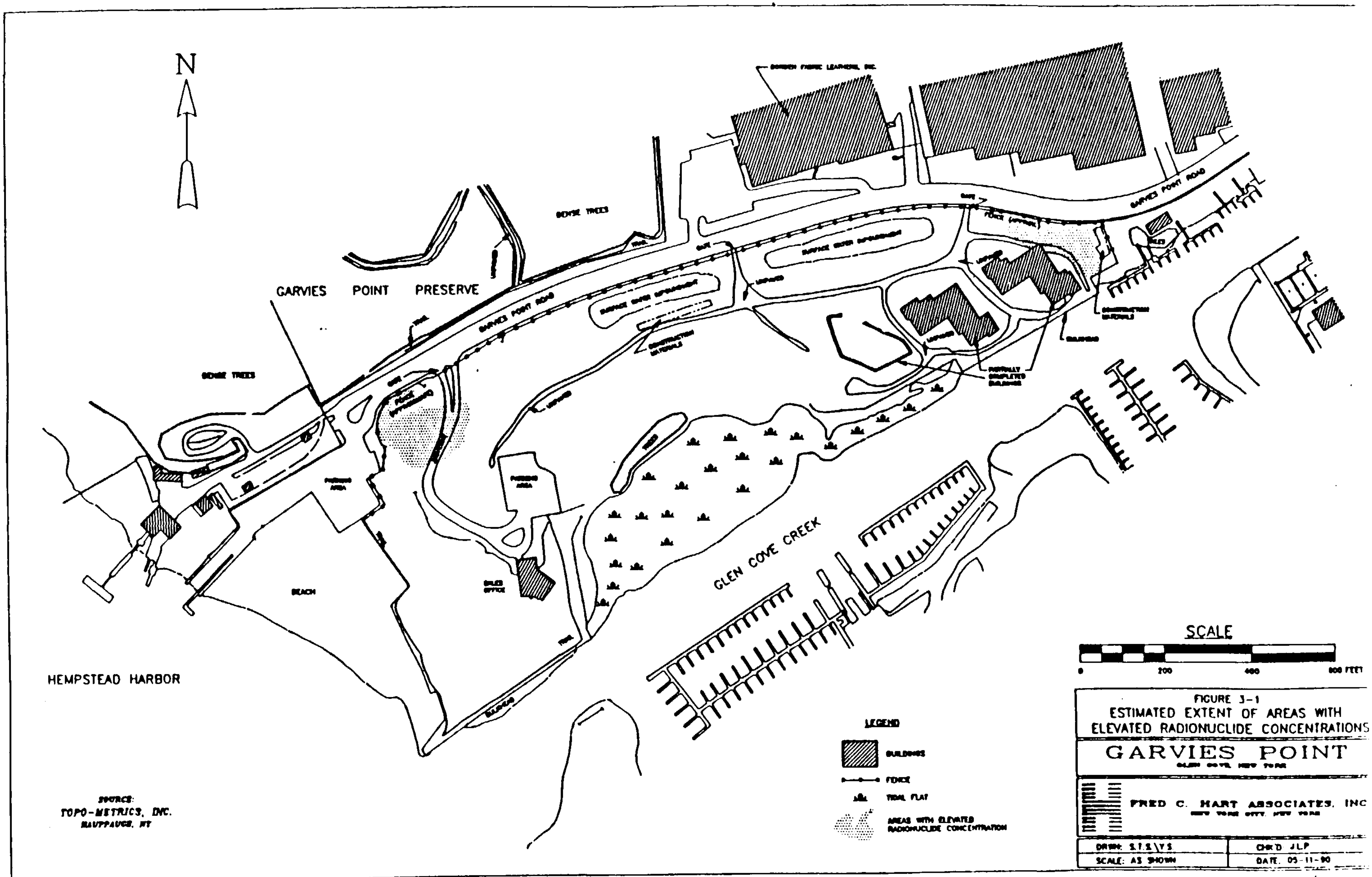

FIGURE 3-1
ESTIMATED EXTENT OF AREAS WITH ELEVATED RADIONUCLIDE CONCENTRATIONS

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approximately 18,750 square feet. The thickness of the material containing the black granular ore varies from location to location within each area, but is an average of eight feet thick. Therefore, the total volume of soil in this area is approximately 14,000 cu yds.

3.3 Impact of Findings on Remedial Investigation

Based upon the results of both the large area gamma ray detector survey and the analysis of samples from the trenches, Ted Rahon, the NDL health physicist has determined that the Remedial Investigation can be conducted as planned with some minor modifications to the Health and Safety Plan. During any test boring activities within either of the two zones of elevated radionuclide concentrations, respirators and tyvek should be worn and all soil samples should be screened with a microR meter. Since the trenching activities did not generate any detectable levels of radionuclides in the air in the vicinity of the work area, it is unlikely that the boring activities, which cause less soil disturbance, would cause any particulate generation. Therefore, the only changes necessary to the Health and Safety plan are those mentioned above for on-site worker protection. The revised sections of the Health and Safety Plan are shown in Figure 3-2.

Access to the entire site has been restricted by the construction of a fence around all sides of the site not adjacent to the creek. In addition, "No Trespassing" signs have been posted. In order to provide protection to anyone gaining unauthorized access to the site, the areas in the vicinity of the driveway and on the eastern side of the site will be roped off and "Do Not Enter" signs will be posted. Since the majority of the site showed below background levels of radionuclides, no other access restrictions are necessary.

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Figure 3-2

TABLE 8-1

FIELD INVESTIGATION TEAM

SITE SAFETY PLAN

A. GENERAL INFORMATION

SITE: Garvies Point PROJECT NO.: 130032

LOCATION: Glen Cove, New York

PREPARED BY: John Persico DATE: January 25, 1989

REVISED BY: Laura Truettner DATE: May 11, 1990

OBJECTIVE(S): Drill test borings, install groundwater monitoring wells and conduct air, subsurface soil and groundwater sampling to identify soil and groundwater contamination, if any.

PROPOSED DATE(S) OF INVESTIGATION: Summer 1990

BACKGROUND REVIEW PRELIMINARY: COMPLETE: X

DOCUMENTATION/SUMMARY: OVERALL HAZARD: SERIOUS MODERATE LOW X UNKNOWN

B. SITE/MATERIAL CHARACTERISTICS

MATERIAL TYPE(S): LIQUID SOLID X SLUDGE X GAS X

CHARACTERISTIC(S): CORROSIVE IGNITABLE RADIOACTIVE VOLATILE X TOXIC X REACTIVE UNKNOWN OTHER (NAME):

SITE DESCRIPTION: The site has been used as a disposal area for sediment dredged from Glen Cove Creek, low level ore from Li Tungsten and as a municipal landfill.

PRINCIPAL DISPOSAL METHOD (type and location): Surface dumping.

STATUS (active, inactive, unknown): Inactive

HISTORY: Sediment dredged from Glen Cove Creek by the Army Corps of Engineers was disposed of at the site in 1960 and 1965. From 1971 to the early 1980s, the site was used as a municipal landfill. Incinerator ash, wastewater treatment plant sludge, and household and street debris were deposited on the site during this period. Soil samples collected in 1985 contained metals and estimated levels of pesticides and PCBs and a groundwater sample from one upgradient well contained several volatile compounds in concentrations exceeding Class GA guidelines. Soil samples collected in 1989 and 1990 showed elevated levels of radionuclides in two discrete areas of the site (Figure 8-1).

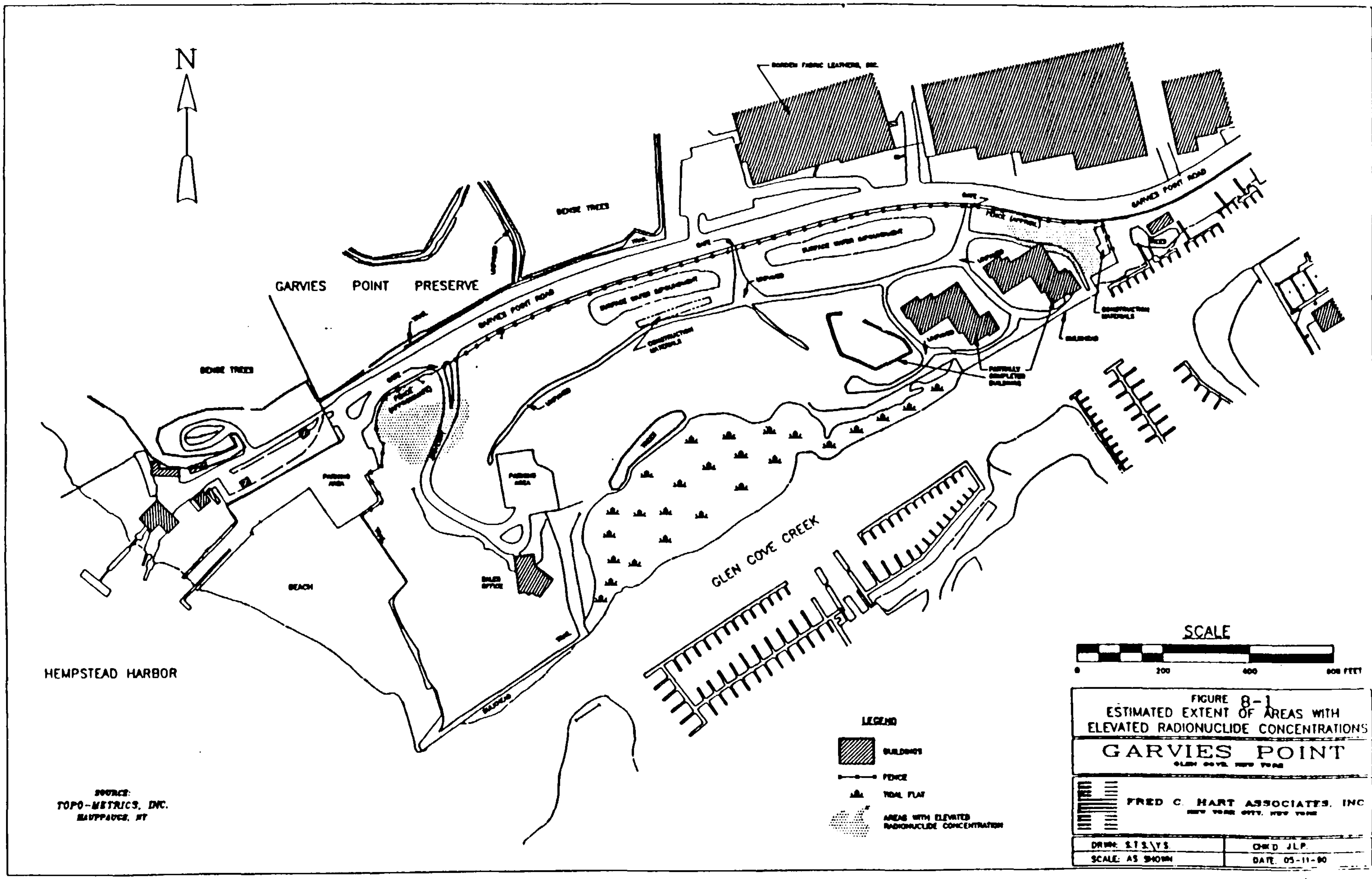

FIGURE 8-1
ESTIMATED EXTENT OF AREAS WITH
ELEVATED RADIONUCLIDE CONCENTRATIONS

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Figure 3-2 (Continued)

TABLE 8-1 (CONTINUED)
C. HAZARD EVALUATION

Based on the 1985 and 1990 samples, a low potential exists for exposure at the site. Some particulate matter may be dispersed into the air during soil disturbance activities and a particulate dust monitor should be used to monitor these concentrations. In addition, when working in the areas shown in Figure 8-1, respirators and tyvek must be worn and all soil samples and sampling equipment should be screened with a microR meter. Certain hazards typically associated with landfills, such as production of methane or other organic vapors, must also be addressed.

D. SITE SAFETY WORK PLAN

PERIMETER ESTABLISHMENT: MAP/SKETCH ATTACHED? Yes SITE SECURED? Yes

PERIMETER IDENTIFIED? Yes ZONE(S) OF CONTAMINATION IDENTIFIED? Yes, radiological zones of contamination are identified

PERSONNEL PROTECTION:

LEVEL OF PROTECTION: D (with Level C equipment available on-site for all work conducted in radiological exclusion zones).

SURVEILLANCE EQUIPMENT AND MATERIALS: Photoionization detector, Drager air monitoring kit with tubes for vinyl chloride, combustible gas indicator, and personal particulate dust monitors, microR meter.

DECONTAMINATION PROCEDURES: All sampling equipment will be decontaminated between each use with the following procedure: detergent and water wash, distilled water rinse, nitric acid rinse, acetone or methanol rinse, hexane rinse, air dry. One decontamination area will be established on-site for steam cleaning and a separate station for hand and boot washing and disposal of personnel equipment will be established. Personnel equipment will be held on-site until sampling results become available, at which time it will be appropriately disposed of.

SPECIAL EQUIPMENT, FACILITIES, OR PROCEDURES: None

PREMISES ENTRY PROCEDURES: To be arranged with Village Green Realty at Garvies Point, Inc.

<u>TEAM MEMBER</u> (Major)	<u>RESPONSIBILITY</u>
James Perazzo	Project Director
Laura Truettner	Project Manager
Peter Conde	Field Team Leader
John Persico	Site Safety Officer
WORK LIMITATIONS (time of day, etc.):	Daylight hours

INVESTIGATION-DERIVED MATERIAL DISPOSAL: All development and purge water will be collected in 55 gallon drums and placed in an on-site, lined pool for temporary storage. A sample will be collected from the pool and
(2567n-34)

Rr.10
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Figure 3-2 (Continued)

TABLE 8-1 (CONTINUED)

analyzed for TCL organics and TAL inorganics to determine appropriate on-site or off-site disposal alternatives. Drill cuttings will be left on-site at each boring location.

E. EMERGENCY INFORMATION

LOCAL RESOURCES

POLICE: Nassau County Police 911
City of Glen Cove Police (516) 676-1000

FIRE DEPARTMENT: City of Glen Cove Fire Dept. (516) 676-0366

EXPLOSIVES UNIT: City of Glen Cove Police (516) 676-1000

AMBULANCE: City of Glen Cove Police (516) 676-1000 (request ambulance)

HOSPITAL EMERGENCY ROOM: Glen Cove Community Hospital (516) 676-5000 (request emergency room)

POISON CONTROL CENTER: Nassau County Medical Center, Uniondale (516) 542-2323

SITE RESOURCES

WATER SUPPLY:	To be arranged with Village Green Realty at Garvies Point, Inc.
TELEPHONE:	To be arranged with Village Green Realty at Garvies Point, Inc.
RADIO:	n/a
OTHER:	n/a

EMERGENCY CONTACTS

POSITION	PERSONNEL	PHONE
CORPORATE SAFETY DIRECTOR	Larry Kaufman	(609) 663-0440
PROJECT DIRECTOR	James Perazzo	(212) 840-3990
CLIENT CONTACT	Eric Zoellner	(301) 727-3351
NYSDEC CONTACT	Christopher Magee	(518) 457-5637

(2567n-35)

R.F.10
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Figure 3-2 (Continued)

TABLE 8-1 (CONTINUED)

F. EMERGENCY ROUTES

Directions to Glen Cove Community Hospital: Take Garvies Point Road east. Make right onto Herb Hill Road, proceed to Charles Street, make right turn and continue to traffic light. Make left onto Forest Avenue. Take Forest Avenue north approximately 1 mile to Walnut Road. Right turn onto Walnut Road, take Walnut Road 1 block to St. Andrews Lane. Make right turn onto St. Andrews Lane and left to emergency room (see Figure 8-2 for map).

RF, 10
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Appendix A

Calculation of Effective Depth of Ore Detection

(2530n-5)

Ref. 10
44.170

CALCULATION OF EFFECTIVE DEPTH OF ORE DETECTION

Assumptions:

Source: 5 meter diameter x 0.5 meter thick slab of thorium-bearing material (Thorium Conc: 100 pCi/g)

Source material density: 3 g/cc; self-absorp. factor: 0.17

Gamma fraction for Tl-208 2.6 MeV from Th-232 parent assuming chain equilibrium: 36%

Detector area: 324 sq.cm.

Soil densities = 1.0, 1.2 and 1.5 g/cc

BKG on 1 foot on sand: 40 cpm

Efficiency of 8"x2" CsI crystal (photofraction + single escape peak for 2.6 MeV - determined experimentally): 60%

Source strength:

100 pCi	9.8×10^6 cc	0.17	3 g	2.22 dpm	0.36 phot	0.6 cts
g			cc	pCi	dis	photon

= 2.4×10^8 cpm excluding geometry and overlaying soil attenuation

103647

KF.10
42.F70

Depth (m)	Geometry[1] Factor	Soil Density	Atten. Factor	Count Rate above BKG (cpm)
1	5.3×10^{-4}	1.5	2.5×10^{-3}	315
		1.25	6.7×10^{-3}	855
		1.0	1.8×10^{-2}	2250
1.5	4.0×10^{-4}	1.5	1.2×10^{-4}	12
		1.25	5.5×10^{-4}	53
		1.0	2.5×10^{-3}	240
2	3.0×10^{-4}	1.5	6.1×10^{-6}	0.4
		1.25	4.5×10^{-5}	3.2
		1.0	6.8×10^{-5}	4.9

1. from <u>Principles of Nuclear Radiation Detection</u>

Ref. 10
43 of 70

Appendix B

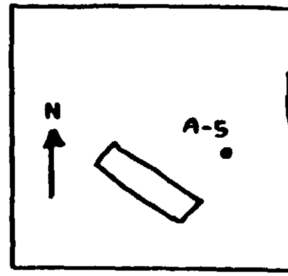
Trench Logs

(2530n-6)

103649

HART

TRENCH LOG



NDL No. 1

Trench No.: Z+75, 5+75

Project Name/Number: Garvies Point / NY102-01

Location: Glen Cove

HART Inspector: Suzanne Morrissey

Excavator/Equip. Operator: Direct / Brent Thompson

Start/Finish Date: 2/9/90 (0855) — 2/9/90 (1330) ①

Elevation: Ground:

Condition of Trench: walls stable

Depth of Trench: 8′

REMARKS:
- selected as a "clean" trench
- all monitoring equipment reads background
- perched trickling water

Sketch of Trench Wall

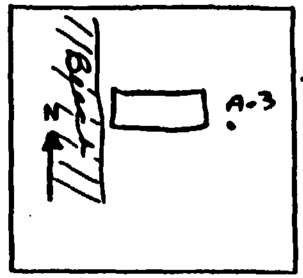
DEPTH 8′ — LENGTH 30′

Depth	Description
surface – 3½′	Black-brown fill, brick fragments, medium-grained sand with gravel, auto parts, root fragments, metal shards, paper (decomposed)
3½′ – 5½′	grey silty sand grading to a reddish-brown silty sand
5½′ – 8′	Brown gravelly sand, medium-coarse grained

103650

HART

TRENCH LOG



NDL No. 2

Trench No.	Project Name/Number	Location
2+75, 3+20	Garvies Point / NY102-01	Glen Cove
HART Inspector	**Excavator/Equip. Operator**	**Start/Finish Date**
Suzanne Morrissey	Direct / Brent Thompson	2/12/90 (0830) - 2/12/90 (1120) 5
Elevation: Ground	**Condition of Trench**	**Depth of Trench**
	stable walls	8'

REMARKS:
- samples collected at 0-6", 2', 4', 6', 8', selected as a background trench ("clean")
- all monitoring equipment reads background except for 1 clay "chunk" (red & grey) which read ~11 uR/hr.

Sketch of Trench Wall

surface

Black fill, clay clumps (see remarks above), branches, concrete, tires, scrap metal, brick, newspaper

DEPTH 8'

7'

Reddish-brown sand with coarse gravel

8'

No groundwater

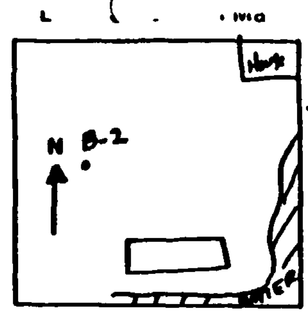
LENGTH 48'

103651

Ref. 1C
45 of 70

HART

TRENCH LOG



NDL No. 3

Trench No.	Project Name/Number	Location
B+25, 1+75	Garvies Point/NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct/Brent Thompson	2/9/90 - 2/9/90 (1030) (1440) ③

Elevation: Ground	Condition of Trench	Depth of Trench
	walls stable	6'

REMARKS:

- selected as a "clean" trench
- all monitoring equipment reads background

Sketch of Trench Wall

surface

Fill - wood, piling fragments, brick, glass, metal wiring, paper, plastic, small boulders

5'

Brown medium-grained silty sand, some gravel

6'

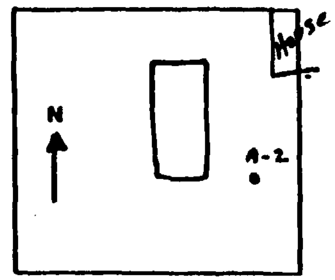
DEPTH 6'

LENGTH 60'

103652

HART

TRENCH LOG



NDL No. 4

Trench No.	Project Name/Number	Location
Z+75, 2+25	Garvies Point /NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct /Brent Thompson	2/9/90 – 2/9/90 (0935) (1445) ③

Elevation: Ground	Condition of Trench	Depth of Trench
	Stable wall	13

REMARKS:

- selected as an investigative trench
- <2% LEL
- HnU and PDM read background

Sketch of Trench Wall

surface

FiLL → tires, wood, metal fragments, glass bottles, branches, paint and dye waste (bluish-purple), concrete with rebar, plastic paper

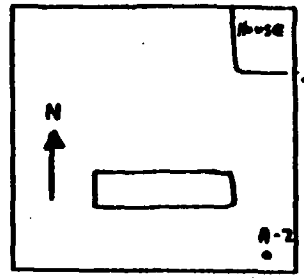
DEPTH 13'

LENGTH 40'

103653

HART

TRENCH LOG



NDL No. 5

Trench No.	Project Name/Number	Location
Z+75, 4+25	Garvies Point / NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct / Brent Thompson	2/9/90 - 2/9/90 (1115) (1435) (4)

Elevation: Ground	Condition of Trench	Depth of Trench
	walls collapsed	10'

REMARKS:
- very damp at bottom but no groundwater
- samples collected at 0-6", 2', 4', 6', 8'

Sketch of Trench Wall

surface

FILL → clothing, glass bottles, small boulders, metal fragments (some very large)

* Due to trench collapse, we had to dig a few feet deeper to place γ-ray detector. It was visible that the fill extends to at least 12' deep.

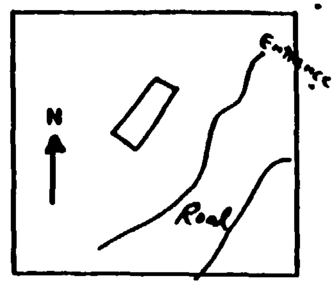
DEPTH 10'

LENGTH 41'

103654

TRENCH LOG

HART



NDL No. 6

Trench No.	Project Name/Number	Location
AREA 1	Garvies Point / NY 102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct / Brent Thompson	2/12/90 - 2/12/90 (0920) (1000) ⑥

Elevation: Ground	Condition of Trench	Depth of Trench
	no collapse	10'

REMARKS:

- samples collected at 0-6", 2', 4', 6', 10' * 4' sample read 900-1,000 uR/hr in backhoe bucket
- Small trench, Ted Rahon didn't want to disturb too much "hot" soil

Sketch of Trench Wall

DEPTH 10'

surface

Fill (low uR readings)

4'

Fill, black ore-like material at 4'-5' (~900 uR/Hr)

4'-8' Hot Zone

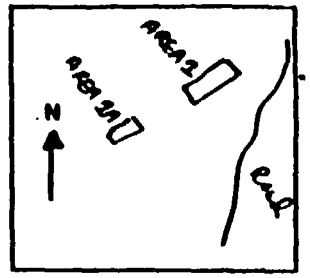
10'

LENGTH 10'

103655

HART

TRENCH LOG



NDL No. 7

offset ~90' SW of trench at Area 1

Trench No.	Project Name/Number	Location
AREA 1A	Garvies Point / NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct / Brent Thompson	2/12/90 (1015) – 2/12/90 (1045) 7

Elevation: Ground	Condition of Trench	Depth of Trench
	small trench, stable walls	6'

REMARKS:

• samples collected at 0-6", 2', 4', 6'

Sketch of Trench Wall

surface

Fill → branches, plastic gloves, McDonald's cartons, plastic bags

4' → ~90 µR/HR

5' → refusal, broke through a concrete layer

6' → background readings, tan medium-grained sand with gravel

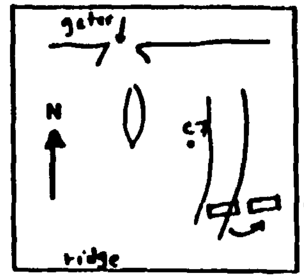
DEPTH 6'

LENGTH 10'

103656

HART

TRENCH LOG



NDL No. 8

Trench No.: B+75, 6+75

Project Name/Number: Garvies Point / NY102-01

Location: Glen Cove

HART Inspector: Suzanne Morrissey

Excavator/Equip. Operator: Direct / Brent Thompson

Start/Finish Date: 2/12/90 – 2/12/90 (1130) (1220) ⑧

Elevation: Ground:

Condition of Trench: partial wall collapse

Depth of Trench: 14'

REMARKS:
- samples collected at 0-6", 2', 4', 6', 8', 12'
- offset ~15' SE because backhoe operator felt shock in his fingers while digging here

Sketch of Trench Wall

surface
0-3' Brown clean (? no bricks, etc.) fill soil

4' → black fill (slag? fragments), ~100 uR/HR

Black fill, tree branches, pilings, tar-like substance, large boulders, ~30 uR/HR

12'

Groundwater ~12-14'

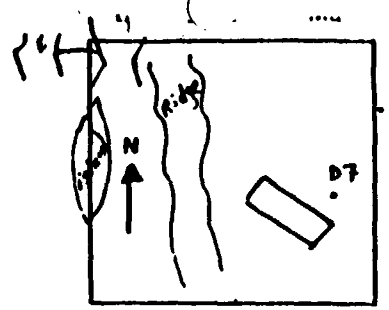
DEPTH 14'

LENGTH 15'

103657

HART

TRENCH LOG



NDL No. 9

Trench No.	Project Name/Number	Location
C+75, 7+25	Gervies Point /NY102-01	Glen Cove
HART Inspector	**Excavator/Equip. Operator**	**Start/Finish Date**
Suzanne Morrissey	Direct / Brent Thompson	2/12/90 – 2/12/90 (1428) (1500) ⑨
Elevation: Ground	**Condition of Trench**	**Depth of Trench**
	walls stable	8′

REMARKS:
- samples collected at 0-6", 2', 4', 6', 8'
- all monitoring equipment background (except at 8')

Sketch of Trench Wall

surface

Black Fill → glass, brick, pilings, cans, branches, large tree stump

8′ → 28 uR/HR (γ → 1463 counts/5 mins)

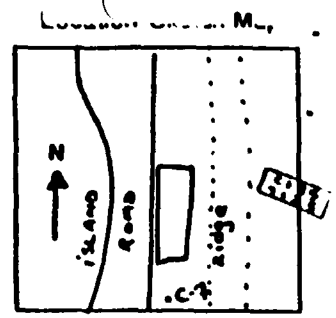
DEPTH 8′

LENGTH 30′

103658

HART

TRENCH LOG



NDL No. 10

Trench No.	Project Name/Number	Location
C+10, 7+40	Garvies Point / NY 102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct / Brent Thompson	2/12/90 - 2/12/90 (1500) (1510) (10)

Elevation: Ground	Condition of Trench	Depth of Trench
	walls stable	5'

REMARKS:
- all monitoring equipment read background
- Sample collected from 4' interval

Sketch of Trench Wall

surface

Fill - brick, wood, logs or piling fragments, large boulders

2' → 25 uR/hr

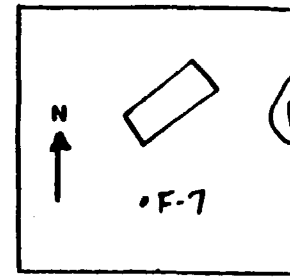
DEPTH 5'

LENGTH 20'

103659

HART

TRENCH LOG



NDL No. 11

Trench No.	Project Name/Number	Location
F+25, 7+25	Garvies Point / NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct / Brent Thompson	2/12/90 - 2/12/90 (1530) (1550) 11

Elevation: Ground	Condition of Trench	Depth of Trench
	walls very unstable, sand collapsing	6'

REMARKS:
- all monitoring equipment reads background
- Samples collected at 0-6", 2', 6'

Sketch of Trench Wall

surface

Brown, medium-grained sand, some gravel (No fill)

5'

Black coarse sand, trace clay

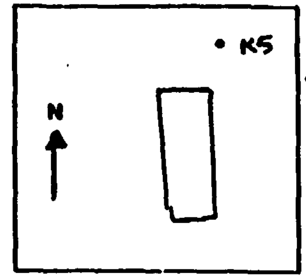
DEPTH 6'

LENGTH 20'

103660

HART

TRENCH LOG



NDL No. 12A

Trench No.	Project Name/Number	Location
J+75, 4+75	Garvies Point/NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct/Brent Thompson	2/12/90 - 2/12/90 (1600) (1630) (12)

Elevation: Ground	Condition of Trench	Depth of Trench
	Collapsing walls (wet and full of garbage)	10'

REMARKS:
- Samples collected at 0-6", 2', 6'

Sketch of Trench Wall

surface

Black fill – tires, wood and piling fragments, tank(?), glass bottles, film-like plastic (is possibly shredded trash bags), cloth, scrap metal

6' → 4% LEL on CGI

10' → 10% LEL on CGI

? Possible Groundwater at 10' (could be garbage waste)

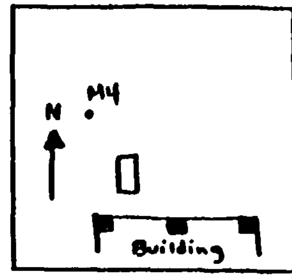
DEPTH 10'

LENGTH 35'

103661

TRENCH LOG

HART



NDL No. 13

Trench No.	Project Name/Number	Location
M+25, 3+75	Garvies Point / NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct / Brent Thompson	2/13/90 - 2/13/90 (0900) (0945) (13)

Elevation: Ground	Condition of Trench	Depth of Trench
	unstable wet walls, no collapse	8'

REMARKS:

- all monitoring equipment background
- Samples collected at 0-6"

Sketch of Trench Wall

surface

Brown fill - scrap metal, rubber, paint and dye waste

0-6" → 10 uR/hr

4'-8' → 7 uR/hr

Groundwater at 8'

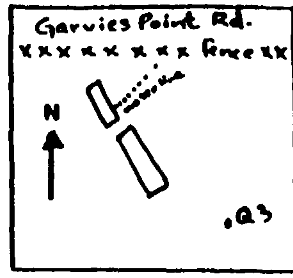
DEPTH 8'

LENGTH 15'

103662

HART

TRENCH LOG



NDL No. 14

Trench No.	**Project Name/Number**	**Location**
P+75, 3+25	Garvies Point / NY102-01	Glen Cove
HART Inspector	**Excavator/Equip. Operator**	**Start/Finish Date**
Suzanne Morrissey	Direct / Brent Thompson	2/13/90 – 2/13/90 (0945) (1040) (14)
Elevation: Ground	**Condition of Trench**	**Depth of Trench**
	walls unstable, partial cave-in	10'

REMARKS:

- Samples collected at 2', 4', 6', 8', 10'
- monitoring equipment reads background
- waterline in area ∴ offset 20' South

Sketch of Trench Wall

surface

Black and Brown fill – plastic bags, large tree stump

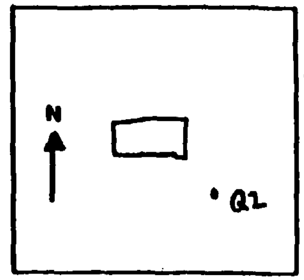
DEPTH 10'

LENGTH 50'

103663

HART

TRENCH LOG



NDL No. 15

Trench No.: Q+10, 2+25

Project Name/Number: Garvies Point /NY102-01

Location: Glen Cove

HART Inspector: Suzanne Morrissey

Excavator/Equip. Operator: Direct / Brent Thompson

Start/Finish Date: 2/13/90 - 2/13/90 (1045) (1100) (15)

Elevation: Ground:

Condition of Trench: unstable walls, no collapse

Depth of Trench: 8'

REMARKS:
- Samples collected at 2', 4', 6'
- monitoring equipment reads background

Sketch of Trench Wall

surface

Black fill

1'

Brown fill

2'

Black fill → wet, branches

Groundwater at 8'

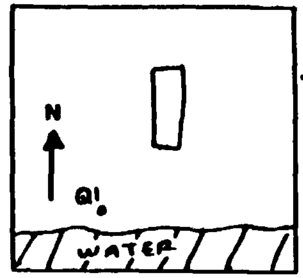
DEPTH 8'

LENGTH 30'

103664

HART

TRENCH LOG



NDL No. 16

Trench No.	Project Name/Number	Location
Q+25, 1+50 (AREA 2)	Garvies Point / NY102-01	Glen Cove
HART Inspector	**Excavator/Equip. Operator**	**Start/Finish Date**
Suzanne Morrissey	Direct / Brent Thompson	2/13/90 (1120) - 2/13/90 (1135) (16)
Elevation: Ground	**Condition of Trench**	**Depth of Trench**
		8'

REMARKS:

• Samples collected at 0-6", 2', 4', 6', 8'

Sketch of Trench Wall

DEPTH 8'

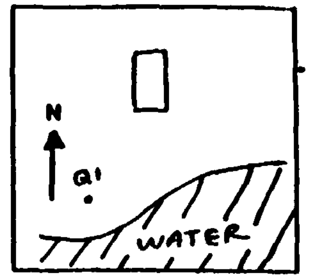
Depth	Description
surface – 2'	Reddish-brown fill (appears "clean")
5'	Black fill
6'	Brown Sandy Fill
8'	Black fill, gravelly, some brick Groundwater at 8'

LENGTH 20'

103665

HART

TRENCH LOG



NDL No. 17

Trench No.	Project Name/Number	Location
Q+50, 1+75	Garvies Point/NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct / Brent Thompson	2/13/90 - 2/13/90 (1145) (1215) 17

Elevation: Ground	Condition of Trench	Depth of Trench
	Fairly stable walls	10'

REMARKS:

• Samples collected at 0-6", 2', 4', 6', 8', 10'

Sketch of Trench Wall

DEPTH 10'

surface

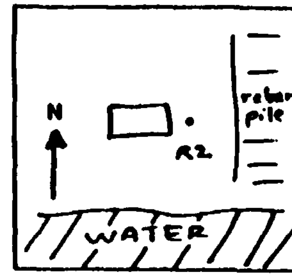
Depth	Description
1'	Black fill
4'	Reddish-brown, clean sand
9'	Black fill
10'	Grey, clay-like layer

LENGTH 30'

103666

HART

TRENCH LOG



NDL No. 18

Trench No.	Project Name/Number	Location
R2 stake	Garvies Point / NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct / Brent Thompson	2/13/90 - 2/13/90 (1345) (1400) 18

Elevation: Ground	Condition of Trench	Depth of Trench
	walls semi-stable	10'

REMARKS:
Samples collected at 0-6", 2', 6', 10'

Sketch of Trench Wall

surface

Brown sandy fill

1'

Black fill - branches, brick, glass, metal shards

~8' → black, oily looking zone, oil-like odor and sheen, shell + brick fragments

10'

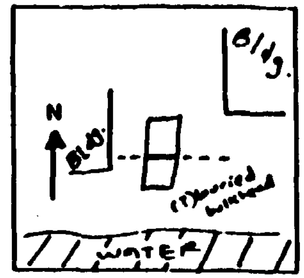
DEPTH 10'

LENGTH 25'

103667

HART

TRENCH LOG



NDL No. 19

Trench No. 0+25, 1+25

Project Name/Number Garvies Point / NY102-01

Location Glen Cove

HART Inspector Suzanne Morrissey

Excavator/Equip. Operator Direct / Bront Thompson

Start/Finish Date 2/13/90 (1445) - 2/13/90 (1515) 19

Elevation: Ground

Condition of Trench Fairly stable

Depth of Trench 8'

REMARKS:
- Samples collected at 8'
- Monitoring equipment reads background

Sketch of Trench Wall

surface

Brownish-grey fill → branches, scrap metal, brick, glass

DEPTH 8'

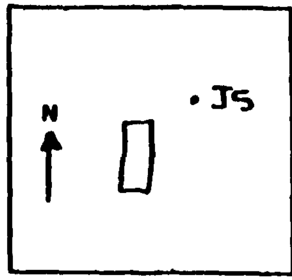
LENGTH 40'

Ref. 10
63 of 70

103668

HART

TRENCH LOG



NDL No. 20

Trench No.	Project Name/Number	Location
I+75, 4+75	Garvies Point / NY102-01	Glen Cove

HART Inspector	Excavator/Equip. Operator	Start/Finish Date
Suzanne Morrissey	Direct / Brent Thompson	2/13/90 (1520) - 2/13/90 (1545) 20

Elevation: Ground	Condition of Trench	Depth of Trench
	fairly unstable	8'

REMARKS:

* No samples collected

Sketch of Trench Wall

surface

Black fill - wet, large tree stump, scrap metal, branches

Groundwater at 8'

DEPTH 8'

LENGTH 15'

103669

65.10
64F70

Appendix C

Laboratory Analytical Data

(2530n-7)

Ref. 10
63,670

Pit #	Grid Location	2.6 MeV CPM	Type of Trench*	Depth (ft)	Soil Description	uR/hr @ 1cm fr soil	NDL Samp. #	Radionuclide Concentration Th-nat (pCi/g)	U-nat (pCi/g)	Ra-226 (pCi/g)
1	Z+75, 5+75	106	BKG	0	top soil	7-9				
				2	gray soil - some refuse	"				
	(W side of property)			4	gray soil - some refuse	"				
				6	gray soil - some refuse	"				
		117,135,181 (N, mid, S)		8-10	yellow clay	"				
2	Z+75 3+20	112	BKG	0	top soil	6-9	10	1.1±0.4	< 3.9	1.1±0.1
	(W side of property)			2	gray soil - some refuse	"	64	0.9±0.4	< 2.9	0.9±0.1
		154 (S)		4	gray soil - some refuse	"	7	< 0.9	< 2.9	0.5±0.1
				6	gray soil - some refuse	"	56	< 0.8	< 1.3	0.4±0.1
		180,176 (N, mid)		8	yellow clay	"	55	< 0.7	< 2.3	0.3±0.1
3	Z+25, 1+75	206	BKG	0	top soil	6-8				
	(W side of property)			2	gray soil - some refuse	"				
				4	gray soil - some refuse	"				
		126,135,147 (E, mid, W)		6	gray soil	"				
4	Z+75, 2+25	194	Invest.	0	top soil	6-12	19	< 1.4	< 3.1	0.6±0.1
	(W side of property)			2	gray soil - some refuse	6-9	20	0.6±0.4	< 2.1	0.6±0.1
				4	"	"	8	0.6±0.3	< 1.4	0.3±0.1
				6	"	"	18	< 1.3	< 1.9	0.5±0.1
		150,164 (E, mid)		8	"	"	9	< 0.6	< 1.4	0.4±0.2
				10	"	"				
		164 (W)		12	"	"				

*BKG - Background
Invest. - to investigate elevated reading

103671

AV.10
66of70

Pit #	Grid Location	2.6 MeV CPM	Type of Trench*	Depth (ft)	Soil Description	µR/hr @ 1cm fr soil	NDL Samp. #	Radionuclide Concentration Th-nat (pCi/g)	U-nat (pCi/g)	Ra-226 (pCi/g)
5	Z+75, 4+25	208	Invest.	0	top soil	8-10				
				2	gray soil - some refuse	"				
	(W side of property)			4	"	"				
		165 (N)		6	"	"				
				8	"	"				
		113,102 (mid,S)		10	"	"				
6	Area 1 B+0, 7+75	488	Invest.	0	top soil	35	13	0.9±0.4	< 3.4	0.9±0.1
				2	brown soil	-	58	0.6±0.4	< 2.9	0.7±0.1
				3	black powder	900				
	(W side of property)			4	"	"	54	583±2	662±49	772±2
				6	"	-	4	1.1±0.6	52.8±2.4	2.7±0.1
				8	"	-				
				10	brown sand	-	65	4.1±0.3	< 6.1	3.1±0.1
7	Area 1a A+75, 6+85	158	Invest.	0	top soil	10	52	2.6±0.5	< 5.9	3.7±0.1
				2	brown soil	-	16	3.3±0.4	< 6.3	3.4±0.1
	(W side of property)			4	very hard, black layer	90	1	28.5±0.6	49.7±3.1	47.4±0.4
				6	brown sand	10	11	0.5±0.4	<1.5	<0.3

Rt. 10
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Pit #	Grid Location	2.6 MeV CPM	Type of Trench*	Depth (ft)	Soil Description	uR/hr @ 1cm fr soil	NDL Samp. #	Radionuclide Concentration Th-nat (pCi/g)	U-nat (pCi/g)	Ra-226 (pCi/g)
8	B+75, 6+75	157	Invest.	0	top soil (on berm)	11	61	0.7±0.5	< 3.0	0.4±0.1
				2	brown soil	-	5	< 0.6	< 2.3	0.4±0.2
	(W side - drvway berm)			4	black granular	30-40	57	28.1±0.7	44.5±3.0	41.3±0.4
				6	"	"	14	19.3±0.5	18.8±2.1	26.4±0.3
				8	"	"	62	4.5±0.3	6.9±1.6	6.8±0.2
				10	"	"				
				12-16	"	"	59	11.6±0.4	13.9±2.1	17.8±0.2
9	C+75, 7+25 to 7+75	155	Invest.	0	top soil (on berm)	10	17	0.8±0.5	< 2.1	0.6±0.1
	(W side - drvway berm)			2	brown/yellow clay	20	60	0.8±0.5	< 2.0	0.8±0.1
				4	"	35	63	1.8±0.4	< 2.1	1.2±0.1
				6	black clay-like	20	66	< 1.1	< 2.0	0.5±0.1
		292		8	"	28	22	3.0±0.4	< 8.3	4.2±0.2
10	C+10, 7+40	173	Invest.	0	top soil (edge of driveway)	10				
	(W side - at drvway pavement)			1	bricks & rubble	13				
				2	brown soil & rocks	25				
				4	black powder	25	15	4.0±0.4	< 10.9	6.6±0.2
11	F+25, 7+25	151	Invest.	0	brown sand	10	23	< 0.9	< 1.5	0.4±0.1
	(mid-property)			2	"	10	3	1.1±0.3	< 2.7	0.6±0.1
		235		6	"	10	2	2.1±0.2	< 1.9	1.1±0.1

103673

Pit #	Grid Location	2.6 MeV CPM	Type of Trench*	Depth (ft)	Soil Description	uR/hr @ 1cm fr soil	NDL Samp. #	Th-nat (pCi/g)	U-nat (pCi/g)	Ra-226 (pCi/g)
12a	J+75, 4+75	162	Invest.	0	soil/gravel	9	6	0.4±0.3	< 2.5	0.5±0.1
	(mid-property)			2	decaying refuse	-	53	0.8±0.3	< 1.4	0.6±0.1
				6	"	-	21	0.7±0.5	< 3.3	0.4±0.1
b	K+0, 4+75	149	Invest.	0	soil/gravel	10				
				2	decaying refuse	8-10				
				6	"	8-10				
13	M+25, 3+75	142	Invest.	0	gravel, waste concrete	8	26	< 0.8	< 1.9	< 0.4
	(near condo)			2	soil, refuse	-	12	0.8±0.5	< 1.8	0.6±0.1
				4	"	-	25	< 0.8	< 3.8	0.4±0.1
		143		6	"	-	24	< 0.6	< 2.5	0.4±0.1
14	P+75, 3+25	214	Invest.	0	brown soil (near prop. fence)	17	-			
	(E side of prop.)			2	brown soil	14	43	< 0.7	< 2.0	0.8±0.1
				4	"	-	45	0.6±0.4	< 1.8	0.7±0.1
				6	black vein (2' thick)	30	46	12.4±0.4	20.8±2.4	16.9±0.2
				8	yellow/black mix	-	48	0.6±0.5	< 2.4	0.7±0.2
				10	gray sand/clay	10	38	0.9±0.4	< 3.0	0.6±0.1
				>10	light brown sand	-				

RE 10
6E.F70

AU,10
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Pit #	Grid Location	2.6 MeV CPM	Type of Trench*	Depth (ft)	Soil Description	uR/hr @ 1cm fr soil	NDL Samp. #	Radionuclide Concentration Th-nat (pCi/g)	U-nat (pCi/g)	Ra-226 (pCi/g)
15	Q+10, 2+25	-	Invest.	0	brown soil (on dirt road nr condo)	40	39	24.4±0.8	57.3±4.3	54.5±0.5
	(Area 3)			0.5	black material (thin layer)	80				
	(E side of prop.)			2	brown/orange sand	15	44	< 0.7	< 4.6	0.8±0.1
				4	black material	75	42	9.5±0.4	13.7±2.0	17.6±0.2
				6	"	"	51	4.8±0.3	< 9.3	6.4±0.1
				8	gray sand/clay (water table)	10				
				>9	refuse	-				
16	Q+25, 1+50	2369	Invest.	0	yellow clay w/ black+bricks	120	37	2.7±0.3	< 5.3	0.9±0.1
	(Area 2)			2	"	14	36	0.7±0.4	< 2.6	< 0.4
	(E side of prop.)			4	light brown sand	20	35	0.7±0.4	< 2.8	< 0.4
				6	gray soil	15	47	1.2±0.4	< 4.2	0.5±0.1
				8	gray sand/clay (water table)	10	50	1.3±0.2	< 4.8	1.9±0.1
17	Q+50, 1+75	312	Invest.	0	gray soil	20	29	4.0±0.3	< 12.5	3.3±0.1
	(E side of prop.)			2	light brown sand	15	34	< 1.0	< 3.9	0.5±0.1
				4	black material w/red bricks	25	27	4.3±0.4	< 10.0	8.3±0.2
				6	"	20				
				8	"	30	28	1.7±0.5	< 6.5	4.0±0.2
				10	gray mud (water table)	15	49	0.5±0.4	< 2.6	1.0±0.2

103675

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Pit #	Grid Location	2.6 MeV CPM	Type of Trench*	Depth (ft)	Soil Description	uR/hr @ 1cm fr soil	NDL Samp. #	Radionuclide Concentration Th-nat (pCi/g)	U-nat (pCi/g)	Ra-226 (pCi/g)
18	R+0, 2+0	152	Invest.	0	brown soil	10	30	0.6±0.5	< 1.8	0.4±0.2
	(E side of prop.)			2	"	20 (60 in hole)	33	3.9±0.4	< 9.7	6.8±0.2
				4	black, yellow, gray mixed layers	20				
				6	"	-	32	2.9±0.5	< 6.6	4.3±0.2
				8	oily clay	10				
				10	light gray clay (water table)	10	41	< 1.8	< 3.5	1.5±0.1
19	0+25, 1+25	132	BKG	0	brown soil	10				
	(between condos)			2	brown/orange sand	10				
				4	"	10				
		217		6	gray/black material	10	31	4.0±0.4	< 7.2	11.1±0.2
				8	"	10	40	< 1.0	< 1.9	0.7±0.1
20	1+75, 4+25	135	BKG	0	gray soil	8				
	(mid-property)			2	garbage & ashes	8				
				4	"	8				
		94		6	"	8				

103676

REFERENCE 11

Captain's Cove Site
Site Inspection Logbook # 1

-17/95

Janis Hettinger
Gerry Zanzalari } Ebasco
Les Skoski } Personnel
Mike Heffron

Site Access to the Captain's Cove Condominium site was obtained by EPA through Sara Flanagan

Site Access to Li Tungsten was obtained via Dennis McGrath of Malcolm Pirnie and Ed Als of EPA.
- Dennis McGrath is the Project Manager of the RI being conducted for the EPA, at the Li Tungsten site.
- Dennis McGrath called Pinkerton Security on Friday April 14th to let them know we will be out on site.
- Dave Edwards is the day guard for Malcolm Pirnie.

Weather sunny with temperatures in the low to mid 60's.

MH

4/17/95

Both the Li Tungsten and Captain's Cove sites will be reconnaissanced today. Waiting on EPA to set up Radiological lab.
- We will walk both sites and mark sample locations.

Mel was joined by Paul K... of our Lyndhurst office.

We held a tailgate health safety meeting and began walking the Capt Cove site.

We walked to all the sample locations and flagged them for sampling. We used an HNU and two micro-R-meters for monitoring organics and radioactivity.

We located the areas designated for radiochemical sampling and flagged the areas with the highest sufficient micro-R-meter readings.

MH

103678

Ref. 11
1 of 28

4/17/95

Finished 12:30 at Cave Site.

12:30 went to lunch.
13:30 Returned to L. Tungsten.
- met with Dave Edwards of Pinkerton Security to gain access to L. Tungsten.

- We walked the L. Tungsten site and flagged the sample locations identified in the sampling plan.

16:30 off-site

[signature] 4/17/95

103679

Ref. 11
2 of 28

4-18-95
weather: sunny 60's
Continued with Site Inspection

0730 P. Lee calibrates
Rad meters.
Ludlum uR/hr model 12
Background - 1000 cpm
CS 137 Source - 7500 cpm
Ludlum uR/hr model 3
Background - 1000 cpm
~~B~~ PL 4-18-95
CS137 source - 7500 cpm

0:7:40 mike Heffron calibrated the
HNU with isobutylene.

Background 0.6 ppm on HNU.

Ebasco sampling personnel on-site:
mike Heffron
Janis Holtinger
Gerry Zanzalari
Pat Lee.

MH

103680

Ref. 11
3 of 28

4/13/95

As we were setting up to sample several people walked across the site walking their dogs.
We told the people that they should not be on the site since it was an old landfill. The people stated that they, and alot of other people, walk their dogs on the site regularly.

We split up into 2 Groups: Mike Heffron / Pat Lee - soils / seds.
Wells - Jerry Zarzalai / Janis Hottlinger

- One of the gates to the site has been completly removed. The site is accessible via vehicles or on foot

4/13/95

CC-SD-02-01 taken at 8:10 by Pat Lee

- R1P1 location of CC-SD-02-01 facing south

- R1P2 Picture of Pat Lee taking sample

- R1P3 Picture of wetland area at low tide.

- Sample description: Black silty sediment mixed with organic material.

- taken along the wetland area, adjacent to Otter Cove Creek, on the eastern end of the wetland

103681

Ref. 11
4 of 28

4/13/95

CC-SD03-01 taken at 8:30 by Pat Lee.

R1P4 - Picture of CC-SD03-01 location up close.

R1P5 Picture of CC-SD03-01 location from 25'

Sample description: sediment taken in pooled area from runoff area of site where Olen Creek [illegible] on the western end of wetland. The sediment surface was rust colored. The sediment was black silt with organic matter.

0850 - P. Lee screens sediment samples with Ludlum MODEL 12 meter (uR/Hr)

Sample #		Readings
CC-SS-02-01	VOA	1000 uR/Hr
CC-SS-02-01	VOA	~~1000~~ uR/Hr
CC-SS-02-01	CN	1000 uR/Hr

4/13/95

Sample #		Readings
CC-SS-02-01	Extractables	1000 uR/Hr
CC-SS-02-01	Inorg	1000 uR/Hr
CC-SS-03-01	VOA	1000 uR/Hr
CC-SS-03-01	VOA	1000 uR/Hr
CC-SS-03-01	Extractables	1000 uR/Hr
CC-SS-03-01	Inorg	1000 uR/Hr
CC-SS-03-01	CN	2000 uR/Hr

2 [initials]

103682

Ref. 11
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4/13/95

CC-SD-01, taken at
10:30 by Pat Lee

CC-SD-01 is the upstream
sediment sample in Glen Cove
Creek above the tidal
influence.
The sample was taken approx
150 feet upstream of the
dam overflow
-sediment was brown silt
with some organic matter.

R1P6 picture of CC-SD-01
sample location

R1P7 Picture of dam limiting
tidal influence of
Glen Cove Creek

mH

4/13/95

CC-SS06-01
taken at 10:45
by Pat Lee

- Soil sample taken from
stained soil around
the rusted 5 gal. pails
on the eastern end of the site.
- silt and medium grained
sand. Brown, but stained
black in areas.

R1P8 Picture of CC-SS06-01
facing

mA

103683

Ref. 11
6 of 28

4/13/95

CC-SS-05-01
MS/MSD
taken by Mike Heffron
at 10:55
Sample taken from soil
under aerosol cans,
paint cans, thinner cans
buried / disposed in this (Eastern side of site)
area. Soil was fine sand
and silt, organic smelling.

R, P9 Picture of CC-SS-05-01

MH

4/13/95

CC-SS03-01
taken at 11:15
by Pat Lee.

R, P10 picture of ink
stained soil CC-SS-03-01
location

silty fine to medium grained
sand. Stained purple in
areas.

The ink stained soil was located
in the middle of the site, approx.
30 feet northwest of the
pile of old creosote coated pilings
on site.

MH

103684

Ref. 11
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4/13/95

CC-5504-01

SAmple taken at 11:20
by Pat Lee
fine sand and silt in and around
rusted drum fragments.

R, P11 picture of CC-5504-0
facing

CC-5507-01
A field call was made based
on finding an area of fragmented
drums.

cc-5507-01 taken at
11:30 by Pat Lee
sample was collected from
soil underlying broken drums. fine sand silt

R, P12 Picture of CC-5507-01
sAmple in rusted drum area.

mb

4/13/95

CC-5508-01
taken by PAT Lee
at 11:35
soil sample take from one of the
many piles on the northwestern
portion of the site.
poorly sorted fine to coarse
grained sand with rounded
cobbles
taken in an area devoid of
vegetation

R, P13 Picture of CC-5508-01

CC-5502-01 taken at
11:45 by Pat Lee
taken in a area devoid of
vegetation. Looks like one
of the old test pit areas
fine sand and silt light
brown.

2, P14 Picture of CC-5502-01
and area devoid of vegetation
wt

103685

Ref. 11
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4/18/95

CC-SS09-01
CC-SS10-01 Duplicate
taken at 11:55 by Bart Lee

-Soil sample taken under standing, rusted and empty drums (2). Brown silty fine sand
Ri Pics picture of CC-SS09-01 CC-SS10 to location of drums

CC-SS01-01 taken by Mike Heffron at 12:05

- Sample obtained from soil under some type of cylindrical rusted metal piece ≈ 1' dia. by 3' long buried. Soil was fine silt mixed with graded pieces of metal and ~~metal~~ melted glass
strange odor.
Ri Pics CSS-01-01

init

4/18/95

CC-GW-02-01
MS/MSD
Triple volume
taken by Mike Heffron
14:30

Temp. 55°F
pH 6.6
Cond. 743

Water slightly turbid.
(Well purge info in logbook #2 of SI)

mdh

103686

Pg. 11
9 of 28

4/18/95

- Sample bottles were scanned @ micro-R-meter < background
- bottles placed in plastic ziplock bags, taped and placed in vermiculite in a plastic bag inside a cooler. Each sample was sealed with a custody seal and the coolers were taped and sealed with a custody seal.

Prepared paperwork, labelled and tagged samples

- All samples were scanned with the micro-R-meter by Pat Lee.
- All of the samples were less than 1000 counts per minute (cpm). This was written on each tag and on the chain-of-custody.

- The outside of the coolers were scanned with the micro-R-meter and all were below background, which is less than 1,000 counts per minute

4/18/95

- A tag was placed on each bottle, a custody seal (signed) was placed on the cap of each sample. The bottle was placed in a plastic ziplock bag.
- The samples were placed in vermiculite packed with ice, covered with more vermiculite and the cooler sealed.
- Strapping tape was used to seal the coolers, and a ~~...~~ a custody seal was placed on the cooler.

- Placed the chain-of-custody Records inside one of the coolers. (Marked top label in cooler: Paperwork Enclosed).

- Shipped the samples to:
Industrial Environmental Analysts
628 Route 10
Whippany, NJ 07981
via Federal Express Airbill #
4090410251

103687

Ref. 11
10 of 28

9/18/95

Left Fed Ex at 19:30
Back at Hotel 20:15.

9/19/95

- I spoke with Edgar Aguado-Flores Project manager, last night. He stated that we should hold off obtaining the radioactive and associated inorganic samples until he verifies the EPA lab.

- Pat Lee pulled a tick off of him last night. The tick had embedded into his skin. We have encountered many ticks on site, but this was the 1st one to embed into someone.

- We obtained the background soil sample CC-SSVI-01 from the top of the Furnes Point Preserve (See Logbook #2).
- Poured Blanks
- Put together all the bottleware/paperwork for tomorrows sampling.

Shipped samples out to IEA
628 Route 10
Whippany, NJ

Fed Ex Airbill
#
48525534326

Ref. 11
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103688

4/20/95

SC-8513-01

On site 1300. Weather partly cloudy. M Heffron & J. Hettinger. Checked surface w/2 MicroR meters. Both reading ~4500 cpm @ surface. Started power auger operation @ 1320.

Ground moist/damp from early rainfall. No dust apparent.

B1 P16
Augured to 24"
Fine sand/silt/some clay
Med brown color.
Rounded cobbles.
MicroR meter reading near base ~4500-5000 cpm.

[illegible]

4/20/95

Continued augering to ~38"
MicroR reading ~10000 cpm (in hole)

[illegible]

103689

Ref. 11
12 of 28

M.H. Took CC-FB03-01 mw 4/19/95
at 15:30

CC-FB03-01 mw was run over a predecontaminated stainless steel spoon washed into a bowl to check the soil sampling equipment.

CC-FB03-01 was taken by Mike Hoffman at 16:00. water was put into a bailer and the bailer poured into a bottle

103690

Ref. 11
13 of 28

4/20/95

CC-SS-13-01
was collected at a depth of
5.5' below grade
- Black granular material
intermixed with clay
readings of ~~80,000~~ 141,000 counts
per minute or ~~3~~ ~~20~~ mR/hr
51.85

CC-SS-13-01 collected at
9:30 by Pat Lee.

R1 P17 Picture of CC-SS13-01
close up

4/20/95

R1 P18 - Picture of CC-SS-12-01
location

CC-SS-12 2500 cpm
at surface
- ~~Initial reading never changed~~
- The readings never went
above 2500 cpm
during the auger advancement.

- Augered 3 different holes down
to a depth of 4.5' and one down to approx.
7' and hit water.

CC-SS-12-01 taken at
12:55 by Pat Lee
- No slag like material was encountered
in this area, however a soil sample
exhibiting 2500 counts per minute, which
is above the 1000 counts per minute background,
was obtained.
- The soil was brown fine to medium grained sand
with some small rounded cobbles.

103691

Ref. 11
14 of 28

4/20/95

CC-SS-14-01

reading 10,000 counts per minute at surface

We augered down approx 3', however the soil became clay like and the readings were not as high as on surface.

TOOK the sample at a depth of 1.5-2' bellow grade at surface 10,000 cpm

-Sample was 4,000cpm

CC-SS-14-01 and CC-SS15-01, The duplicate taken at 13:40 by Rather

Soil was black silty with clay small pieces of black and sometimes rust colored slag

R. P. Sample location CC-SS-14-01 CC SS-15-01

4/20/95

WT-FB01-01 taken at 14:20

The field blank was poured at WT-tank

CC-FB02-01- taken at 15:00

DI Water Blank

103692

Ref. 11 15 of 28

All samples, in the jars, were scanned with the micro-R meter and the radioactivity was written on the sample tag and the chain-of-custody.

All sample jars were scanned and it was determined that the jars did not exhibit radioactivity above background levels.

A custody seal and tag was placed on each jar. The jar was placed in a plastic zip-lock bag, and the sample was placed in a cooler filled with vermiculite and ice.

Strapping tape was used to seal the coolers. The outside of the coolers were wiped down and then scanned with the micro-R meter. No radioactivity levels above background were detected on the outside of the coolers.

Custody seals were placed on the coolers.

The samples to be analyzed for inorganics, cyanide and tungsten were shipped to:

IEA
628 Route 10
Whippany NJ 07981

via Federal Express Airbill #
~~4785253436~~
485253433 0

The samples to be analyzed for Uranium, Thorium, Actinium daughters was sent to

U.S. EPA Narrel
540 South ~~Morris~~ Morris Ave
Montgomery, Alabama 36115

Shipped via Fed Airbill # 48 52 34 363

Ref. 11

Cut & Fill
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

CONTENTS

PAGE NO.	REFERENCE	DATE

LogBook #2 of Captains Cove SI transferred from M. McElroy to James Hollinger

Only one logbook (#1) kept on 4/17/95. The 2nd logbook was started on 4/18/95

[illegible] 4/18/95

[illegible] 4.18.95

103694

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Janis Hottinger - Ebasco
Gerry Zanzalari Personnel

JH

Purging
MW-2 4-18-95
0951 Start CCGW-02-01

Depth to H_2O 7'1.5 10th 10th/ft
Total Depth 15'1.5
Standing H_2O 8'
Well Diameter

Volume (gal) =
~~0.163 x 15.15 - 7.15 uth~~
0.163 x 8(2²) = 5.22 gal

x 3 = 15.66 or 16 gallons

H_2O Description: black
~~He~~ w/ lots of sediments. No
odor, or sheen. - 1st bucket

No HNU readings above background
of 0.2.

2nd Bucket is Light brown
Still w/ sediments, but much
less.

JH

103695

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18 of 28

3rd Bucket - Lighter than 2nd, ~~plus sediment~~.

4th Bucket - Light brown
5th " SLIGHT TURBIDITY
6th " " "
7th " " "
8th " CLEARING LESS TURBID
9-10-11 buckets clearing less turbid.

12th Bucket - clearing, w/ some turbidity still.

Using pH/cond. meter

T° 57.5
pH 6.34
C 745 uS/cm

T° 55
pH 6.56
C 743

6/1/m - 10/3

JH

10:57 am completed bailing well 2.
Moving to MW - 1

Purging CCGW~~X~~01-01
MW-1 11:18am ~~[illegible]~~ JH 4.18.95

Depth to H_2O 14'
Total Depth 19.5
Standing H_2O 4 gallons

X 3 = 12 or 6 buckets
well volumes

1st few bailersful were black, full of sediment and floating plant particles.

Odorless, no sheen

2nd Bucket
3, 4, 5, 6 are all the same - black & turbid.

JH

103696

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7th Bucket sample 1 MW-1

T° 58.5
pH 6.57
C 173.7

sample 2

T° 57.6
pH 6.02
C 165

Done bailing at 12 noon

12-1 lunch

Purging MW-3

1:55 set up for well 3

(C-GW03-01)

~~TOT~~

Depth to H_2O – 6' 5/10

Total depth – 24 5/10

Standing H_2O 18'

JH

$.163 \times 18 (2^2) = 11.74$

or $12 \times 3 = 36$ gallons

$\div$ 2 gal. bucket = 18 bucket loads.

1ST BUCKET BROWN - SLIGHT PETROLEUM ODOR
NO SHEEN

3RD " " " "
NO SHEEN

5TH " LT BROWN - NO SHEEN
INCREASED PETROLEUM ODOR

7th " LT BROWN - NO SHEEN
PETROLEUM ODOR

9th " " " " "

10, 11 same as above

12, 13, 14 same as above.
color has not changed

15, 16, 17, 18, 19

JH

103697

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Bail 19

Test 1
T° 66.2
pH 6.68
C. 166.2

Test 2
T° 62.6
pH 6.6
C 169.5

~~Bucket~~ 19
Same Turbidity
+ color
but diminished Petroleum
odor.

JH

Sampling

MW-1 CCGW-01-01
3:45-4pm

(4) 1 Liter ambers
(2) 40 ml VOAs
1 unfiltered Poly
1 filtered poly
1 cyanide poly

T° ~~5.5~~ 57.6
pH 6.02
Con. ~~342~~ 165
when sampled

odorless
Black, turbid

MW-3 + 4 (4 is dup. of 3)
430-5pm
CCGW-03-01
CCGW-04-01

Med-dark brown, very turbid

8 1 liter
4 VOAs
2 unfiltered
2 cyanide
2 filtered

T° 62.6
pH 6.60
Con. 169.5

JH

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21 of 28

103698

Soil Samples

Background CC-SS-11-01
4-19-96 3:53 pm

JH

Description - odorless, Black loamy soil, w/ roots + Leaves. Covered by deatritus + cobbles

No HNU readings recorded

JH

4/20/95 Li Tungsten
Sample location
LT-SS01-01 0815
Micro R meter reading ~ ~~400 cpm~~ 3.6 450 1600 Kcpm
R2P21, R2P20
V Dark brown soil
Odorless
Sandy / V fine texture
High moisture content
8.6' from wooden tank to sample loc.
17.2' " sample location to cyclone fence
14.1' " " " " Concrete wall
R2 P19 Leaking tank

Sample location
LT-SS02-01 0835
Micro R meter reading 5000 ~ ~~1000~~ kcpm
R2 P18, R2 P17 2000
Very dark brown, reddish material
Odorless, chunks of slag
Fine, sandy soil, some silt
Low moisture
5.0' from green tanker (West)
93.6' " telephone pole (SE)

JH

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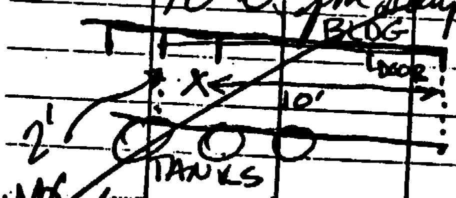
103699

LT-SS05-01
& LT-SS05-01D

OH 4-20-95
~~05-01~~
~~LT-SS01-05~~
~~LT-SS05-05D~~

Sample location
Micro R meter = ~~10,000~~ cpm
LT-SS05-01: 1600
~~LT-SS-05-01D~~: 1500
0907 hrs.
Very dark brown
Odorless, fine, sandy
some silt,
R2 P16, P15
Smaller pieces of tailings
Low moisture
10.0' fm sample loc. to door edge

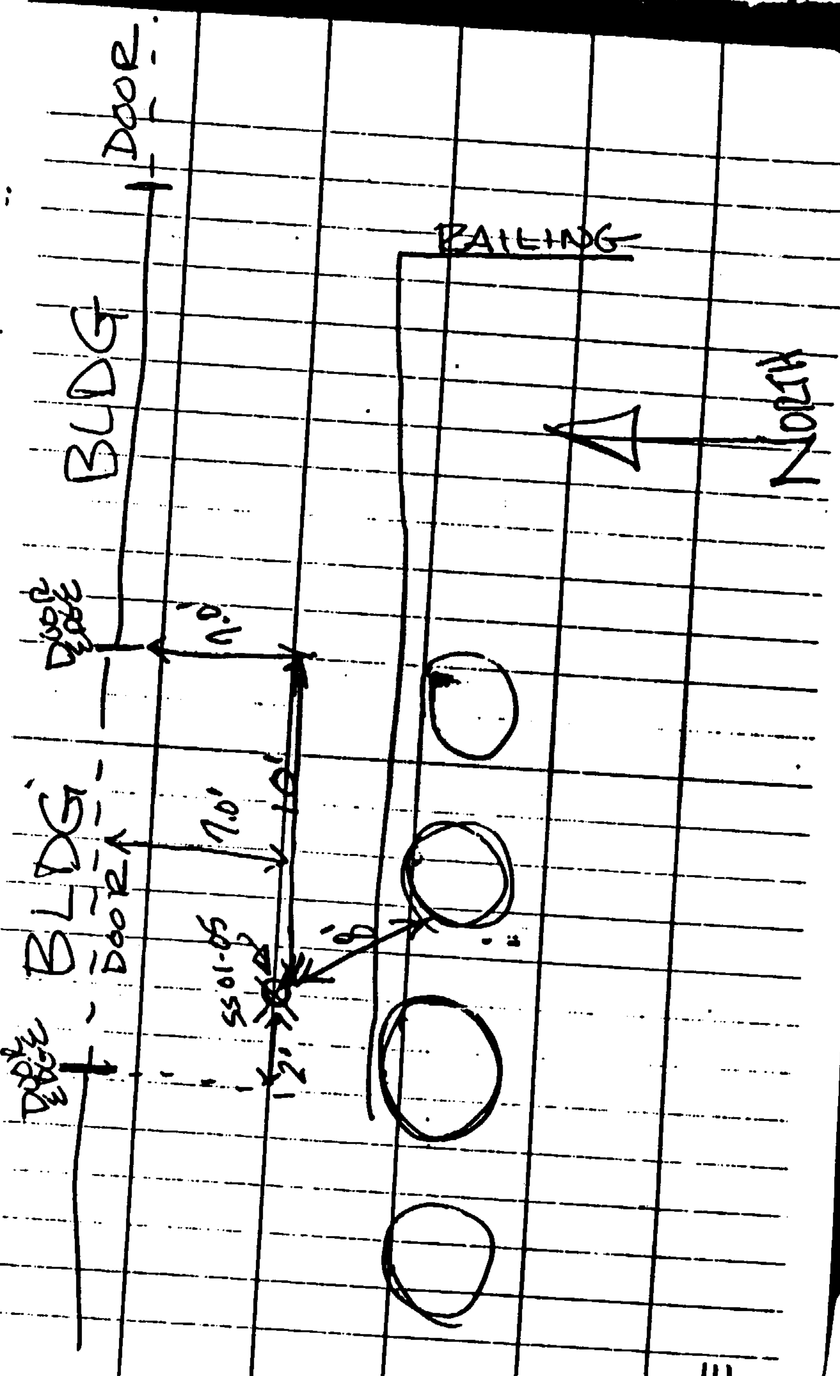


See Fig next page →

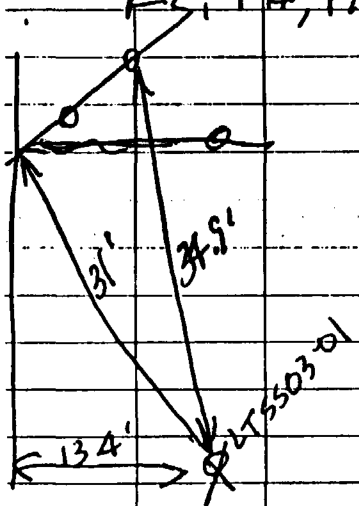
2.0' from samp. loc. to opposite door edge
7.0' fm door

4/20/95

JH

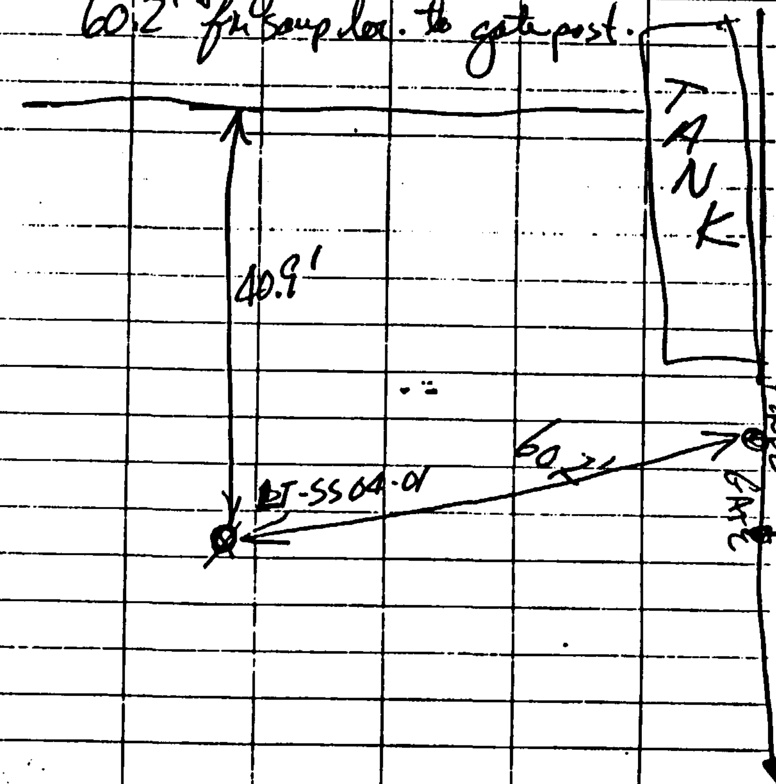


Sample location LTSS03-01
0937
Micro R-meter ~~40,000~~ 1600 KCPM
V fine, silty, sandy, clay.
Very wet!
Med brown
Topmost fine sand, then clayey beneath
R2, P14, P13



JH

Sample loc. LT-SS04-01
0954 hrs.
Micro R meter ~~~30,000~~ 1400 Kcpm
Med brown, sandy, organic material, moist
R2, P12, P10
40.9' fr samp loc to product line upright
60.2' fr samp loc. to gate post.



JH

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103701

LT-SS-

Sample location	K cpm	microR/hr.
01-01	1,600	5.93
02-01	2,000	7.41
03-01	1,600	5.93
04-01	1,400	5.19
05-01	1,600	5.93
05-01D	1500	5.56

conversion factor:

$$\frac{K\,cpm}{270} = \_\_\_\_ \text{ microR/hr.}$$

DH

DH

103702

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14,000 ÷270 51.85 $\frac{microR}{hr}$

CC-SS-13-01 @ ~~80,000~~ Kcpm = ~~216.30~~

0730 hrs. Pat Lee

CC-SS 12-01 @ 2,500 Kcpm = 9.26 $\frac{microR}{hr}$

1255 hrs. Pat Lee

JH

Background soil samples

Surface samples - CC-SS-~~1X~~-02
- black, loamy soil w/ lots of organic material
- No odor
- 1530 hrs.

Auger sample CC-SS-11-03
- taken at 4' deep
- no odor
- orange + black sandy loam w/ little organic matter.
1530 hrs.

JH

103703

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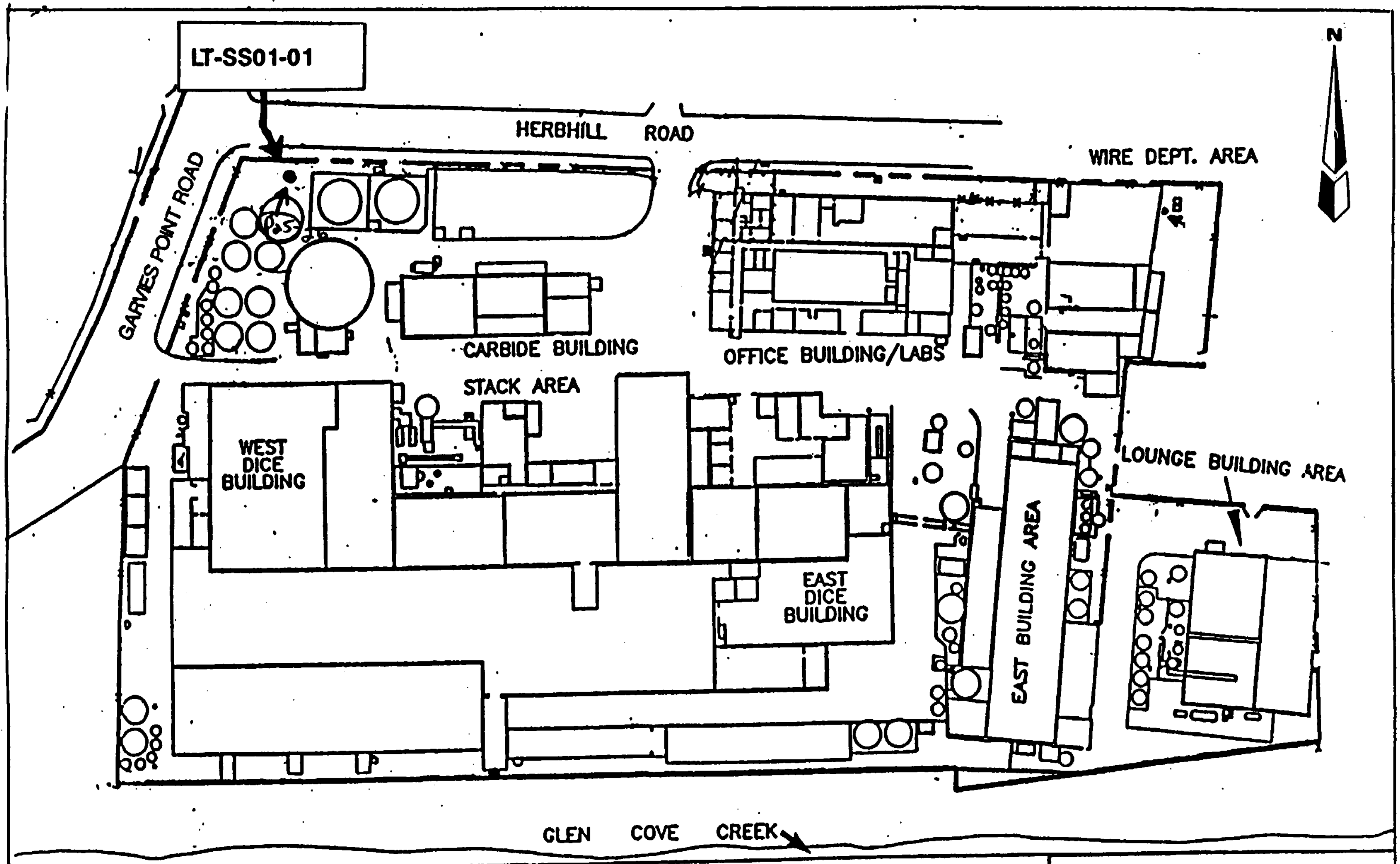
Photo Location Map



EBASCO SERVICES, INC.	**LI TUNGSTEN SITE** **SAMPLE LOCATION MAP** **PARCEL A**	**FIGURE 5** FIGURE SOURCE: NDL, PRELIMINARY RADIOLOGICAL ASSESSMENT 1989

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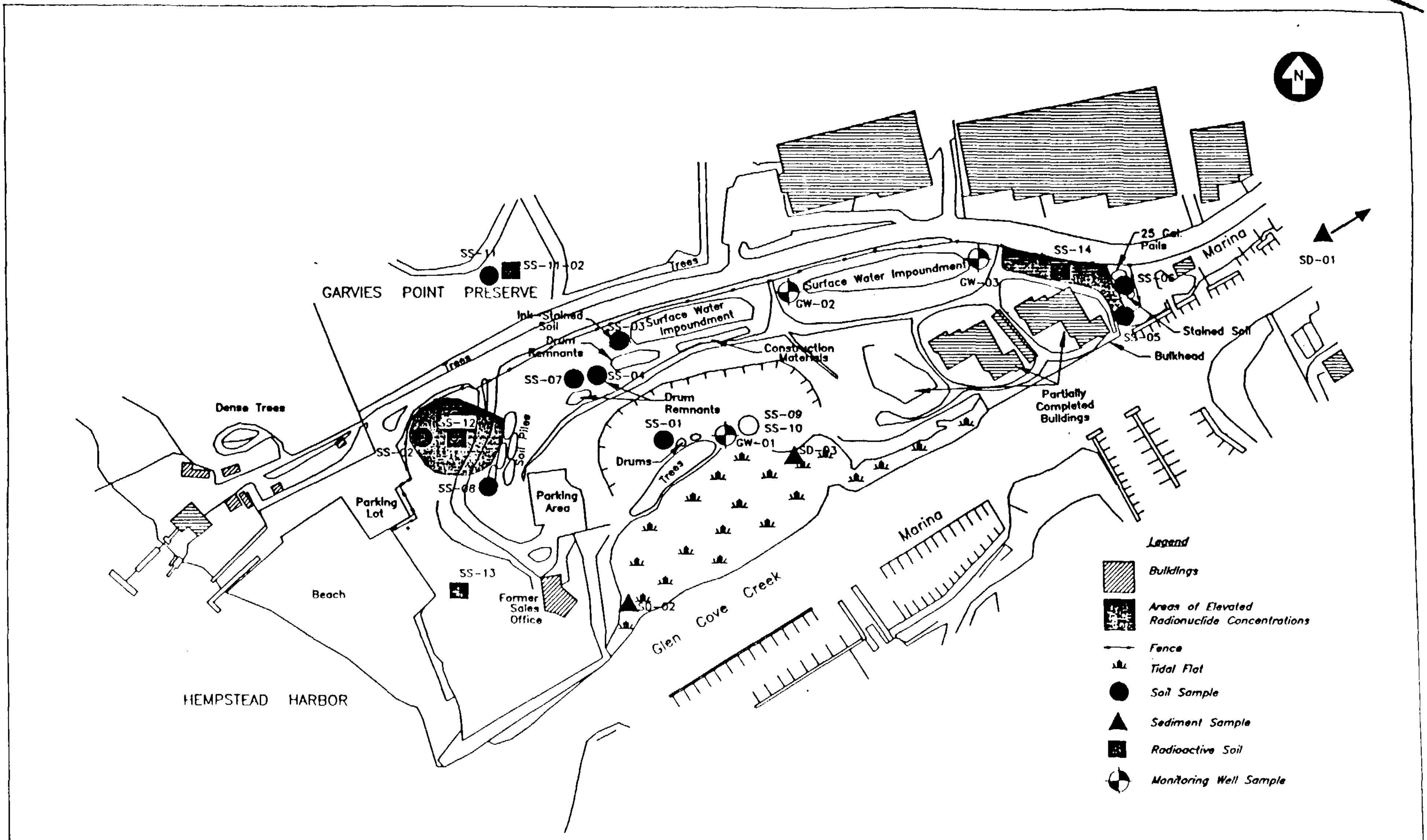

Source: Topo-Metrics, Inc. Hauppauge, NY

0 300' 600'

Approximate scale

SAMPLE LOCATION MAP
Captains Cove Site
Garvies Point, Nassau County, New York

EBASCO SERVICES, INC.

FIGURE 2

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REFERENCE 12

SURFACE AND SUBSURFACE SOILS OBTAINED AT CAPTAIN'S COVE CONDOMINIUM SITE
(ALL RESULTS IN MG/KG)

			CAPTAIN'S COVE SURFACE S SOILS		CAPTAIN'S COVE SUBSURFACE SOILS	
CONTAMINANT	CC-SS11-02 (BACKGROUND TAKEN AT 0-6")	CC-SS11-02 (BACKGROUND TAKEN AT 4')	CC-SS14-01	CC-SS15-01 (DUPLICATE OF CC-SS14-01)	CC-SS12-01	CC-SS13-01
TUNGSTEN	185 J	1.4 J	3,200 J	3,820 J	51	1,210 J

SURFACE SOIL OBTAINED AT LI TUNGSTEN SITE
(ALL RESULTS IN MG/KG)

CONTAMINANT	CC-SS11-02 (BACKGROUND TAKEN AT 0-6")	LT-SS01-01	LT-SS02-01	LT-SS03-01	LT-SS04-01	LT-SS05-01	LT-SS05-01D
TUNGSTEN	185 J	3,050 J	16,200 J	1,160 J	4,540 J	1,160	1,420 J

103707

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CAPTAIN'S COVE
DATA VALIDATION REPORT
TUNGSTEN

Prepared by: Cecelia N. Minch

Cecelia N. Minch

Date: 7/1/95

103708

BRIDGEPORT RENTAL AND OIL SERVICES
DATA VALIDATION REPORT

SUMMARY:

This case consisted of 2 aqueous field blanks and 12 soil samples collected on April 20, 1995 and designated for the analysis of tungsten by ICP-MS method 200.8. One field duplicate pair (LTSS05-01/05D) was collected and analyzed with satisfactory results. All soil results were reported on a dry weight basis. The % solid reported for sample CC-SS11-02 in this package was greater than 50%. However, the data user should be aware that in the report drafted for the metals analysis performed by IEANJ, the % solid was less than 50%. No action was taken.
Although a CLP package format was requested, several of the usual QC analyses were not performed since they are not specified in the method. In addition, since tungsten (W) is not listed on the target analyte list of the method, no CRDL was defined.
All data, however, were evaluated for Level IV DQO, employing USEPA Region II validation criteria. The specifics for each parameter and associated QC are detailed below.
The sample identifications used in this report have been truncated for expediency. Unless otherwise indicated, all sample IDs are suffixed with -01.

PRESERVATION:
The chains of custody indicated that the aqueous samples were preserved. The lab performed a check of the pH upon receipt, but did not provide documentation of the actual pH. Contact with the lab confirmed that all pH values were <2. No action was taken.

HOLDING TIMES:
All samples were prepped and analyzed within specified holding times.

MATRIX SPIKES:
The soil spike failed recovery criteria, but no action was required since the sample concentration was greater than 4 times the amount of spike added.
The aqueous spike was acceptable.

LAB DUPLICATES:
The % solids reported for the sample and lab duplicate varied by more than 1 %. Therefore, the reviewer converted the sample results to wet weight and recalculated the RPD, which met criteria.
The aqueous duplicate was acceptable.

FIELD DUPLICATE:
The results of the field duplicate were acceptable.

LAB CONTROL SAMPLE (LCS):
The lab attempted to analyze a LCS, but no certified stock was available containing tungsten. The LCS that was analyzed did not contain any tungsten, so the results were not reported. No action was taken based on this criteria.

SERIAL DILUTION:
No serial dilution was performed. The following soil data were qualified as estimated (J) because the sample result exceeded 10 times the quantitation limit.

SS11-02, SS13, SS14, SS15, SS01, SS02, SS03, SS04, SS05-01D

No action was taken to the aqueous data since a serial dilution is not required to be performed on a field blank.

BLANK CONTAMINATION:
No qualifications were required.

INSTRUMENT CALIBRATION:
A CRI standard was not analyzed for W. No action was taken to the data since there was no specified CRDL.

INTERFERENCE CHECK SAMPLE (ICS):
An ICS was not performed. No interference was expected from the usual elements since the mass of interest for W is so high. No action was taken.

GENERAL COMMENTS:

Sample results were adjusted by the reviewer to correct for premature rounding performed by the laboratory.

The lab did not perform an IDL study or perform a linear range analysis. All samples were diluted to fall within the calibration range established by the initial calibration.

A from was not provided which summarized the results for the calibration blanks.

The client identifications for samples 9504608-08A and 09A required correction on the cross-reference supplied by the North Carolina lab.

The reported results for the soil spike required correction by the reviewer.

TELEPHONE RECORD LOG

Date of Call: 6/21/95

Laboratory Name: IEA

Lab Contact: Leanne

Client: Foster Wheeler Envn.

Client Contact: C. Minch

Call Initiated By: ____ Laboratory x Client

In reference to data for the following sample number(s):

Captain's Cove ICP-MS data for Tungsten

Summary of Questions/Issues Discussed:

1. A CLP package format was requested. On the IEA COC, it was indicated that analyses were to be performed per ILMO3.0 (CLP) protocol. Regardless of the method utilized, all of the usual QC should have been run. Please submit the following raw data and/or summary form.
   1) Percent solids determinations. Were sample results reported on a dry weight basis?
   2) tuning solution analysis.
   3) CCB summary of results.
   4) LCSS summary of results.
   5) IDL with date of last determination.
   6) linear ranges.
2. Please submit a cross-reference of sample IDs with IEANC.
3. Why were prep blanks diluted?
4. In the method, the final volume for soil preparations is 50 ml, but the runlog indicates 100ml. Was this taken into account during quantification?

Cecilia N. Minch
Signature

6/21/95
Date

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5. I cannot reproduce the reported results. Please supply a sample calculation for each matrix. Were results corrected for any interferences or blank subtracted? Include all necessary information to reproduce all values.

6. Why wasn't a serial dilution, interference check sample or CRI standard analyzed? They are CLP protocol for metals.

7. The wrong units were used for all aqueous data. Please resubmit.

R5.12
7.F39

6/21	IEANJ - Leanne: Briefly discuss items on faxed phone log.
6/22	IEANJ - Leanne: Informed me that requests were forwarded to IEANC and that she will be out of the office on 6/23.
6/23	IEANJ: Mike left a message that resubs will be delayed.
6/26	IEANJ: Leanne called to say that the resubs should be faxed to her in the afternoon and fedex to me for 6/27 AM.
6/27	IEANJ: Leanne called to say that the resubs are incomplete. Do I want a messenger to delivery a partial resub or wait for complete delivery on 6/28? I will wait for complete set.
6/28	IEANC: Message from G. Folk. An attempt to return the call was made at 5:01, but switchboard was off.
6/29	IEANC: Spoke with Gary regarding the unresolved questions. He will convey my concerns to the inorganic manager and get back to me in PM. No return call.
6/30	IEANC: Gary was unable to effectively explain the response to the dilution issues. I asked to speak with the IO manager D. Stogner. Spoke at length with Don regarding the prep and analysis. He will submit a brief explanation of the procedure and IDL determination.
7/1	IEANC: Spoke with don regarding the missing LCSS. He explained that no certified stock was available. Furthermore, the LCSS run appeared not to contain any W.
7/1	IEANJ: Spoke with Leanne to confirm that the pH was checked for the aqueous samples.

Ref. 12
8.F34

Memo

To: Cecelia Minch

From: Donald Stogner DCS

Subject: Tungsten by Method 200.8

Date: June 30, 1995

Please find listed below information to clarify how IEA performs 200.8 and information pertaining to your tungsten analysis specifically. Additionally I have included a copy of the dry weight log to aid in your calculations. If any questions are not answered here please do not hesitate to call.

IEA-NC performs 200.8 for soils by digesting one gram of sample using ultrex II grade acids following the steps listed in the 4.4 version of 200.8 from publication PB91-231498 section 11.2.2. After the digestion is complete IEA takes the sample to 100 ml and allows it to settle overnight. The method states to dilute the sample five fold prior to analysis. IEA performs this step immediately before analysis by pipetting 2 ml to 10 ml and adding internal standards. Should any reanalysis be required IEA repeats the dilution step from the one hundred ml final digested at either the required five fold dilution or higher. If the internal standards are outside the method specified range the lab dilutes the sample two fold from the original analysis and repeats this step until the internal standards meet the required method criteria. All dilutions on the runlog are listed from the one hundred ml digested. The sample would be originally listed as a 5X. A sample diluted one ml to one liter due to high analyte would be listed as a 1000X. The result would therefore be the dilution factor listed on the runlog times the final volume of one hundred ml times the instrument result divide by the dry weight and the weight. The instrument result in ug/l, final volume units would be in liters, the weight in grams, and the dry weight expressed as a fraction. This yields ug/g which is equivalent to mg/kg.

The waters are digested 100 ml initial volume to 50 ml final volume. The sample is diluted 2.5 fold per the method just prior to analysis. The dilution listed on the runlog is the dilution made from the 50 ml digestate. The result would be the instrument result times the final volume times the dilution factor divided by the initial volume. The result in ug/l is converted to mg/l and reported. All the digestates are left undiluted until analysis to make them as stable as possible. The dilution prior to analysis is specified in the method to reduce damage to the nickel cones.

Method 200.8 does not specify that a CRI, serial dilution, or Interference check be run. Iron, aluminum, calcium, magnesium do not interfere with mass spectroscopy since these masses are at 56 and 57, 27, 40 and 42, and 24 mass units. The only analyte in the method near these masses is manganese at 55 amu. Tungsten is at masses 182 and 184 and only has a small interference from osmium at 182. Both masses were monitored and agreed very well. Had an interference been observed mass 184 would have been used. Either mass may be used for these samples as no osmium appeared to be present.

IEA did not perform an idl study for tungsten. A five ug/l ICV was used and recovered very well with low RSD and a SD of 0.016085. From this data the lab reported a PQL of 1 ug/l. Since no linear range study was performed all samples were diluted below the calibration standard of 100 ug/l. CCVs were run at midrange of 50 ug/l.

All samples for this project were stored in the dark since tungsten is light sensitive to insure the stability of the digestates.

Donald Stogner

Donald Stogner
Inorganics Lab Manager

IEA
An Aquarion Company

628 Route 10
Whippany, New Jersey 07981

Phone 201·428·8181
Fax 201·428·6222

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RECEIVED
JUN 2 1995
E. AGUADO

CLP DATA PACKAGE

SAMPLING DATE APRIL 20, 1995

IEA JOB NO: 20950-51723B-REVISED

VOLUME 1 OF 1

PREPARED BY:

INDUSTRIAL ENVIRONMENTAL ANALYSTS (IEA)

(CERTIFICATION NUMBER 14530)

FOR

FOSTER WHEELER ENVIRONMENTAL CORPORATION

PROJECT: CCP

PROJECT: 1254-204 BATCH: 9504608 METHOD: EPA 200.8

Samples: Twelve (12) Soils and Two (2) Water Samples

The samples were received at Industrial and Environmental Analysts, Inc. (IEA) on April 24, 1995. Each sample was assigned a 9-character "IEA" lab identification number (lab ID) and an abbreviated client ID which is referenced on the IEA Assigned Number Index. All analyses are performed in accordance with EPA approved methodologies and meet the requirements of the IEA Quality Assurance Program. Please see the enclosed data package for your results and Chain of Custody documentation.

The pH of all samples for Metals analysis was less than two (2) at the time of sample preparation.

Any nonconformances associated with the analysis of the samples in this project are as follows:

The quantitation limits for samples 9504608-01 through 05 and 09 through 14 were elevated due to a dilution prior to analysis. The samples were diluted due to high levels of Tungsten.

I certify that this data package is in compliance with the procedures and methods defined for this project, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data (if applicable) as submitted has been authorized by the laboratory manager or his designee, as verified by the following signature.

Wallace L. McAnulty

Wallace L. McAnulty
Inorganic Technical Data Reviewer
IEA, Inc.
May 30, 1995

IEA, Inc Doc# RPT00900.NC

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CHAIN OF CUSTODY DOCUMENTATION

51723

EBASCO SERVICES INCORPORATED
CHAIN OF CUSTODY RECORD

PROJECT: CC.

SAMPLERS: (Signature) [illegible signatures]

	SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	NO. CONTAINERS	TCL VOA	TCL BNA	TCL PEST./PCB	TAL METALS	CYANIDE	Tymple			REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
1	CC-SS12-01	4/20/95	12:55		X				X	X	X				9.26 uR/hr.	Y	
2	CC-SS13-01	4/20/95	9:30		X				X	X	X				51.85 uR/hr.	Y	
3	CC-SS14-01	4/20/95	13:40		X				X	X	X				14.8 uR/hr.	Y	
4	CC-SS15-01	4/20/95	13:40		X				X	X	X				14.8 uR/hr.	Y	
5	CC-SS-11-02	4/20/95	15:30		X				X	X	X				3.1 uR/hr.	Y	
6	CC-SS11-03	4/20/95	15:30		X				X	X	X				3.1 uR/hr.	Y	
7	CC-FB02-01	4/20/95	14:20		X				X	X	X				Field Blank	Y	HNO_3 metals / NaOH CN
8	CC-FB01-01	4/20/95	15:00		X				X	X	X				Field Blank	Y	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Shipped via:
① [signature]	4/20/95	Fed Ex	④		
②			Received for Laboratory by: (Signature) [signature]	4/21/95 / 8:30	Shipped Ticket No.
③			Remarks: Shipped via Fed Ex Airbill # 485253430		

103719

003004

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51723

EBASCO SERVICES INCORPORATED
CHAIN OF CUSTODY RECORD

PROJECT: C.C.

SAMPLERS: (Signature) [signature] Potter

	SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	NO. CONTAINERS	TCL VOA	TCL BNA	TCL PEST./PCB	TAL METALS	CYANIDE	Tungsten			REMARKS OR SAMPLE LOCATION	ICED	SPECIFY CHEMICALS ADDED AND FINAL pH IF KNOWN
9	LT-5501-01	4/20/95	8:15		X				X	X	X				5.93 mR/hr.	X	
10	LT-5502-01	4/20/95	8:35		X				X	X	X				9.41 mR/hr.	X	
11	LT-5503-01	4/20/95	9:37		X				X	X	X				5.93 mR/hr.	X	
12	LT-5504-01	4/20/95	9:54*		X				X	X	X				5.19 mR/hr.	X	
13	LT-5505-01	4/20/95	9:07		X				X	X	X				5.93 mR/hr.	X	
14	LT-5505-01D	4/20/95	9:07		X				X	X	X				5.56 mR/hr.	X	

*Per Mike Heffron's request on 4/27/95, Lab to designate this sample for MS/MSD /[initials] 4/27/95

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Shipped via:
① [signature]	4/20/95	Fed Ex	④		
②			Received for Laboratory by: (Signature) [signature]	4/21/95 9:30	Shipped Ticket No.
③			Remarks: Shipped via Fed Ex Airbill # 4850534330		

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14 of [illegible]

IEA OF NEW JERSEY
628 Route 10 Whippany, N.J. 07981
(201) 428-8181

CHAIN OF CUSTODY

Nº 06113

FIELD BOOK:________ Pg____of____

(1) Client: KnInS

(2) Project Name/no.: 20950 51123

(3) Client Contact: L. Schorbach

(4) IEA Contact:

(5) TAT: 1wk, 2wk, 3wk,*, OTHER 5/2/95

(6) Proj. Type: NJPDES, NPDES, ISRA, CLP, CERCLA, RCRA, UST, ACO, MOA, OTHER

(7) Protocol: CLP, SW846, EPA 600, DW, OTHER

(8) Reporting Type: NJ Regulatory Format, NJ Reduced Format, CLP, Level II, Level I (Data Summaries), Other

(13) # OF CONTAINERS

(14) Bill To

PO#

(15) ANALYSIS REQUIRED: Tungsten ICP/MS

For Lab Use Only: Job No., Quote No., # of Coolers, Cooler Temp. (s), Custody Seal # (s), Date Due

PM NON-CONFORMANCE: Preserved, Temp., Container, Volume, Broken, Initials, Holding Time, Other

Logged By:

(9) Client ID (10 CHAR)	(10) Date	(11) Time	(12) Mtx	(13) # of Containers	Tungsten ICP/MS	DESCRIPTION
CCSS12-01	4/20	1255	SO	1	x	50723 001
CCSS13-01		930		1	x	002
CCSS14-01		1340		1	x	003
CCSS15-01		1340		1	x	004
CCSS11-02		1530		1	x	005
CCSS11-03		1530		1	x	006
CCFD02-01		1420	AQ	1	x	007
CCFB01-01		1500	AQ	1	x	008
LTSS01-01		815	SO	1	x	009
LTSS02-01		835		1	x	010
LTSS03-01		937		1	x	011
LTSS04-01		954		1	x	012
LTSS05-01		907		1	x	013
LTSS05-01D		907		1	x	014

(16) COMMENTS: (Please include hazards on site.)
RUN BY ICP/MS
CLP PROTOCOL ILM3.0
IEA# 1254-204
3°C

(17)

	Print Name and Company	Signature	Custody Seal # (s)	Date/Time
Sampled By:				/
Received By:				/
Relinquished By:	John Pfoeffinger IEA	[signature]		4/21/95 / 1300
Received By:	D. McCormick IEA	D. McCormick		4-24-95 / 0900
Relinquished By:				/
Received By:				/

Mtx = Matrix of Sample. (AI=Air, AQ=Aqueous, LE=Leachate, ML=Misc Liquid, MS=Misc Solids, OIL, SE=Sediment, SL=Sludge, SO=Soil)

* Standard TAT.

(Copies: White and yellow copies should accompany samples to IEA. The pink copy should be retained by the client.) See reverse for directions.

103721

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0C0307

IEA OF NEW JERSEY
SAMPLE CONTROL CHRONICLE

Sampling Date: 4/20/95 Job #: 51723

Receipt Date: 4/21/95 Signature: [signature]

Custody Seal: Present/Absent
Intact/Not Intact Cooler Temp: 4

Chain of Custody: Present/Absent

Sample Tags: Present/ Absent Preservative Ck: ✓

Shipping Bill: Present/ Absent Airbill #:

Comments:

Subcontracting

Parameter	Sample ID	Parameter	Sample ID
MBAS		TKN	
AMMONIA		O-PHOSPHATE	
COD		SULFIDE	
SULFATE		COLIFORM	
NITRATE		ALKALINITY	
BOD		TURBIDITY	
NITRATE		COLOR	
NITRITE		TOC	
RADIUM		TOX	
THORIUM		OTHER W	1-14
URANIUM		OTHER	

Subcontract Lab: Hanov Date:

Signature: [signature]

Sample Prep

Sample #

Compositing:

Percent Solids: 1-6, 8-14

pH Performed:

Signature: [signature] Date: 4-27-95

Page ____ OF 98
IEA Logbook# SM6

Form# SMF00601.NJ

TUNGSTEN

Industrial & Environmental Analysts, Inc. (IEA)

:EA Project #: 1254-204
:EA Sample #: 9504608-01
:lient Name: IEA - New Jersey
:lient Proj. I.D.:20950-51723
;ample I.D.: CCSS12-01

Matrix: Soil
Date Received: 04/24/95
Date Sampled: 04/20/95

arameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
-Tungsten	EPA 200.8	5.7 mg/kg*	51 mg/kg	05/08/95	05/24/95	FW

:omments:

Quantitation limit elevated due to sample dilution prior to analysis.
Sample diluted due to high concentration of interferent.

ORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #:	1254-204		
IEA Sample #:	9504690-02	Matrix:	Soil
Client Name:	IEA - New Jersey	Date Received:	04/24/95
Client Proj. I.D.:	20950-51723	Date Sampled:	04/20/95
Sample I.D.:	CCSS13-01		

Parameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
-Tungsten	EPA 200.8	59 mg/kg*	~~1200~~ mg/kg 1310 J	05/08/95	05/24/95	FW

Comments:

Quantitation limit elevated due to sample dilution prior to analysis.
Sample diluted due to high concentration of interferent.

FORM RESP3 Rev. 030994

Ref.12
000011
20 of 39

Industrial & Environmental Analysts, Inc. (IEA)

80%

:A Project #:	1254-204		
:A Sample #:	9504608-03	Matrix:	Soil
lient Name:	IEA - New Jersey	Date Received:	04/24/95
lient Proj. I.D.:	20950-51723	Date Sampled:	04/20/95
mple I.D.:	CCS814-01		

arameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
Tungsten	EPA 200.8	120 mg/kg*	3200 mg/kg	05/08/95	05/24/95	FW

mments:

uantitation limit elevated due to sample dilution prior to analysis.
ample diluted due to high concentration of interferent.

RM RESP3 Rev. 030994

103726

000012 Ref. 1
21 of 34

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 1254-204
IEA Sample #: 9504688-04
Client Name: IEA - New Jersey
Client Proj. I.D.: 20950-51723
Sample I.D.: CCSS15-01

Matrix: Soil
Date Received: 04/24/95
Date Sampled: 04/20/95

Parameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
T-Tungsten	EPA 200.8	240 mg/kg*	3800 mg/kg J	05/08/95	05/24/95	FW

Comments:

*Quantitation limit elevated due to sample dilution prior to analysis.
Sample diluted due to high concentration of interferent.

ORM RESP3 Rev. 030994

103727

Ref. 12
CC0013
2 of 34

Industrial & Environmental Analysts, Inc. (IEA)

EA Project #: 1254-284
EA Sample #: 9584688-85
lient Name: IEA - New Jersey
lient Proj. I.D.:20958-51723
ample I.D.: CCSS11-82

Matrix: Soil
Date Received: 84/24/95
Date Sampled: 84/20/95

arameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
-Tungsten	EPA 288.8	7.7 mg/kg*	188 mg/kg	85/88/95	85/24/95	FW

omments:

uantitation limit elevated due to sample dilution prior to analysis.
ample diluted due to high concentration of interferent.

RM RESP3 Rev. 830994

Ref. 12
23 of 34

CC0014

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 1254-204
IEA Sample #: 9504600-06
Client Name: IEA - New Jersey
Client Proj. I.D.: 20950-51723
Sample I.D.: CCSS11-03

Matrix: Soil
Date Received: 04/24/95
Date Sampled: 04/20/95

Parameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
-Tungsten	EPA 200.8	0.55 mg/kg	1.4 mg/kg	05/08/95	05/24/95	FW

Comments:

FORM RESP3 Rev. 030994

103729

Industrial & Environmental Analysts, Inc. (IEA)

EA Project #: 1254-284
EA Sample #: 9504688-07
lient Name: IEA - New Jersey
lient Proj. I.D.: 20950-51723
ample I.D.: CCFB02-01

Matrix: Water
Date Received: 04/24/95
Date Sampled: 04/20/95

arameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
-Tungsten	EPA 200.8	0.001 mg/L	BQL	05/08/95	05/24/95	FW

omments:

ORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 1254-204
IEA Sample #: 9504608-08
Client Name: IEA - New Jersey
Client Proj. I.D.:20956-51723
Sample I.D.: LTFB0101

Matrix: Water
Date Received: 04/24/95
Date Sampled: 04/20/95

Parameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
T-Tungsten	EPA 200.8	0.001 mg/L	BQL	05/08/95	05/24/95	FW

Comments:

FORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)

EA Project #: 1254-204
EA Sample #: 9504600-09
lient Name: IEA - New Jersey
lient Proj. I.D.: 20950-51723
ample I.D.: LT-SS01-01

Matrix: Soil
Date Received: 04/24/95
Date Sampled: 04/20/95

arameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
-Tungsten	EPA 200.8	260 mg/kg*	~~3600~~ mg/kg J	05/08/95	05/24/95	FW

mments:

uantitation limit elevated due to sample dilution prior to analysis.
ample diluted due to high concentration of interferent.

RM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)

EA Project #: 1254-204
EA Sample #: 9504600-10
lient Name: IEA - New Jersey
lient Proj. I.D.: 20950-51723
ample I.D.: LT-SS02-01

Matrix: Soil
Date Received: 04/24/95
Date Sampled: 04/20/95

arameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
-Tungsten	EPA 200.8	1200 mg/kg*	~~16000~~ mg/kg 16200 J	05/08/95	05/24/95	FW

mments:

uantitation limit elevated due to sample dilution prior to analysis.
ample diluted due to high concentration of interferent.

RM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)

EA Project #:	1254-204		
EA Sample #:	9504608-11	Matrix:	Soil
lient Name:	IEA - New Jersey	Date Received:	04/24/95
lient Proj. I.D.:	20950-51723	Date Sampled:	04/20/95
ample I.D.:	LT-SS03-01		

arameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
Tungsten	EPA 200.8	120 mg/kg*	~~1200~~ mg/kg 1160 J	05/08/95	05/24/95	FW

mments:

Quantitation limit elevated due to sample dilution prior to analysis.
Sample diluted due to high concentration of interferent.

ORM RESP3 Rev. 030994

Ref. 12
29 of 39

Industrial & Environmental Analysts, Inc. (IEA)

A Project #: 1254-204 (Revision)
A Sample #: 9504608-12
ient Name: IEA - New Jersey
ient Proj. I.D.:20950-51723
mple I.D.: LT-SS04-01

Matrix: Soil
Date Received: 04/24/95
Date Sampled: 04/20/95

rameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
Tungsten	EPA 200.8	250 mg/kg*	~~4500~~ 4540 mg/kg J	05/08/95	05/24/95	FW

mments:

uantitation limit elevated due to sample dilution prior to analysis.
ample diluted due to high concentration of interferent.

RM RESP3 Rev. 030994

103735

Industrial & Environmental Analysts, Inc. (IEA)

A Project #:	1254-204		
A Sample #:	9504608-13	Matrix:	Soil
ient Name:	IEA - New Jersey	Date Received:	04/24/95
ient Proj. I.D.:	20950-51723	Date Sampled:	04/20/95
mple I.D.:	LT-SS05-01		

rameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
Tungsten	EPA 200.8	140 mg/kg*	1200 mg/kg	05/08/95	05/24/95	FW

mments:

uantitation limit elevated due to sample dilution prior to analysis.
ample diluted due to high concentration of interferent.

RM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)

EA Project #: 1254-204
EA Sample #: 9504600-14 Matrix: Soil
lient Name: IEA - New Jersey Date Received: 04/24/95
lient Proj. I.D.: 20950-51723 Date Sampled: 04/20/95
ample I.D.: LT-SS05-01D

arameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
-Tungsten	EPA 200.8	140 mg/kg*	1400 mg/kg	05/08/95	05/24/95	FW

omments:

Quantitation limit elevated due to sample dilution prior to analysis.
Sample diluted due to high concentration of interferent.

ORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)

EA Project #: 1254-204
EA Sample #: 9504688
lient Name: IEA - New Jersey
lient Proj. I.D.: 20950-51723
ample I.D.: QC Blank

Matrix: Solid
Date Received: N/A
Date Sampled: N/A

arameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
-Tungsten	EPA 200.8	0.50 mg/kg	BQL	05/08/95	05/24/95	FW

mments:

rresponding Samples: 9504688-01 through 06 and 09 through 14

RM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)

:A Project #: 1254-204
:A Sample #: 9504608
.ient Name: IEA - New Jersey
.ient Proj. I.D.: 20950-51723
ımple I.D.: QC Blank

Matrix: Water
Date Received: N/A
Date Sampled: N/A

ırameter	Method	Quantitation Limits	Results	Date Prepared	Date Analyzed	Analyst
Tungsten	EPA 200.8	0.001 mg/L	BQL	05/08/95	05/24/95	FW

ımments:

ırresponding Samples: 9504608-07 and 08

›RM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)

INORGANIC QC SUMMARY
DUPLICATE ANALYSIS

IEA Project No.: 1254-204
IEA Sample No.: 9504608
Matrix: Soil

IEA Reference No.	Test Parameter	Method	DUPLICATE RESULTS Sample (mg/kg)	Duplicate (mg/kg)	RPD (%)	Date Analyzed
9504608-12	T-Tungsten	EPA 200.8	~~4400~~	~~3800~~	15	05/24/95
		dry	4542	3762	17	
		wet	[illegible]	[illegible]	17	

$$RPD = \frac{S-D}{(S+D)/2} \times 100$$

Control Limits: +/- 20%

Comments:

Corresponding Samples: 9504608-01 through 06 and 09 through 14

FORM IQCSUM Rev 103194

Industrial & Environmental Analysts, Inc. (IEA)

INORGANIC QC SUMMARY
DUPLICATE ANALYSIS

IEA Project No.:1254-204
IEA Sample No.: 9504608
Matrix: Water

IEA Reference No.	Test Parameter	Method	DUPLICATE RESULTS Sample (mg/L)	Duplicate (mg/L)	RPD (%)	Date Analyzed
9504608-07	T-Tungsten	EPA 200.8	<0.001	<0.001	0	05/24/95

$$RPD = \frac{S-D}{(S+D)/2} \times 100$$

Control Limits: +/- 20%

Comments:

Corresponding Samples: 9504608-07 and 08

FORM IQCSUM Rev 103194

36.F39
CC0027

Industrial & Environmental Analysts, Inc. (IEA)

INORGANIC QC SUMMARY
SPIKE RESULTS

:EA Project No.: 1254-204
:EA Sample No.: 9504608
Matrix: Soil

:EA Reference No.	Test Parameter	Method	SPIKE RESULTS (mg/kg) SA	SR	SSR	%R	Analysis Date
504608-12	T-Tungsten	EPA 200.8	12	~~4400~~ [illegible]	~~3600~~ [illegible]	0 [illegible]	05/24/95

%R = (SSR - SR)/ (SA) * 100   Control Limits: 75 - 125%

comments:

Percent recovery not calculated due to the sample concentration being greater than four times the concentration of the spiking solution.

Corresponding Samples: 9504608-01 through 06 and 09 through 14

FORM IQCSPK Rev 103194

NS 12
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CC0028

Industrial & Environmental Analysts, Inc. (IEA)

INORGANIC QC SUMMARY
SPIKE RESULTS

IEA Project No.: 1254-204
IEA Sample No.: 9504600
Matrix: Water

IEA Reference No.	Test Parameter	Method	SPIKE RESULTS (mg/L) SA	SR	SSR	%R	Analysis Date
9504600-07	T-Tungsten	EPA 200.8	0.10	<0.001	0.10	~~100~~ 103	05/24/95

%R = (SSR - SR)/ (SA) * 100

Control Limits: 75 - 125%

Comments:

Corresponding Samples: 9504600-07 and 08

FORM IQCSPK Rev 103194

103743

Industrial & Environmental Analysts, Inc. (IEA)

INORGANIC QC SUMMARY
Laboratory Control Sample

IEA Project No.: 1254-204
IEA Sample No.: 9504608

Parameter	Method	True Value (mg/L)	Found	% Recovery	Analysis Date
T-Tungsten	EPA 200.8	0.100	0.104	104	05/24/95

Comments:

Control limit is 80% - 120% for all metals.

FORM QCLCSW Rev.030994

Industrial & Environmental Analysts, Inc. (IEA)

CALIBRATION VERIFICATION

IEA Project No.: 1254-204
IEA Sample No.: 9504600

Parameter	ICV Value (mg/L)	ICV Found (mg/L)	% Recovery	CCV Value (mg/L)	CCV Start (mg/L)	% Recovery	CCV End (mg/L)	% Recovery	Analysis Date
Tungsten	0.005	0.005	100	~~0.0050~~	~~0.0050~~	~~100~~	~~0.051~~	~~102~~	05/24/95
				[illegible]	[illegible]	[illegible]	[illegible]	99.4	

CCV

Comments:

Control limit is 90% - 110% for all metals, except Hg which is 80% - 120%.
Control limit is 85% - 115% for all wet chemistry parameters.

RM CALVER REV 030994

REFERENCE 13

TO: M. Heffron DATE: 8/11/95

FROM: C. Minch

SUBJECT: CAPTAIN'S COVE SAMPLE RESULTS AND DATA VALIDATION REPORT

Mike,

Enclosed are the results and data validation report for the uranium and thorium analyses conducted on samples collected from the Captain's Cove Site. Edgar asked me to send them directly to you because of the time constraints. If you have any questions, I can be reached at (908) 270 - 0988.

Celia

cc: E. Aguado

Ref 13
2 of 45

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR
National Air and Radiation Environmental Laboratory
540 South Morris Avenue, Montgomery, AL 36115-2601
(334) 270-3400

August 4, 1995

MEMORANDUM

SUBJECT: Radiochemical Results for Captain's Cove Samples

FROM: John Griggs, Chief
Monitoring and Analytical Services Branch

Vicki Lloyd, Director
NAREL Technical Support Center (TSC) J Scott Telofski for

TO: Catherine Moyik, Site Assessment Manager
Superfund, Region 2

Attached are data packages for gross alpha and beta, gamma and isotopic uranium and thorium analyses of water and soil samples collected at the Captain's Cove Condominium Site located in Glen Cove, Nassau County, New York. The samples constitute NAREL batch numbers 95-00015 and 95-00016.

Although no analytical problems were encountered in analyzing NAREL Sample T34C 95.03174, we are reanalyzing the sample because of possible inconsistencies between the measured activities of radionuclides which are normally in equilibrium. The results of the reanalysis will be reported as soon as they are available.

Radiochemical analyses usually require the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these six nuclides is undetected, NAREL reports it as "Not Detected," or "ND," and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the analytical results, the analytical process, or the reporting format, contact Dr. John Griggs at (334) 270-3450. If you have any project-specific questions or questions concerning data application, contact Vicki Lloyd at (334) 270-3467.

Attachments

cc: Paul Giardina, Region 2, w/o attachments
Edgar Aguado, Ebasco, w/attachments
Mary Clark, (6601J), w/o attachments
Sam T. Windham

CAPTAIN'S COVE
RADIOCHEMICAL
DATA VALIDATION REPORT
NARAL BATCH # 95-00015

Prepared by:

Cecelia N. Minch

Cecelia N. Minch

Date:

8/11/95

CAPTAINS COVE
DATA VALIDATION REPORT
NAREL Batch # 95-00015

SUMMARY:

This case consisted of 12 soil samples collected on April 20, 1995 and designated for the analysis of uranium and thorium by alpha spectrometry. One field duplicate pair (LTSS05-01/05D) was collected and analyzed with satisfactory results.
The laboratory documented in the narrative that problems were encountered with the uranium analyses of samples LT-SS03-01, LT-SS04-01 and the replicate of LT-SS04-01. Matrix interferences may be responsible since reanalyses produced similar results. The data user should also be aware that the laboratory thought it prudent to reanalyze sample CC-SS13-01 due to possible inconsistencies (see letter of August 4, 1995), the results of which will follow at a later date.
All data were evaluated for Level D DQO, employing USEPA Region II inorganic data validation criteria to the extent possible. The specifics for each parameter and associated QC are detailed below. The sample identifications used in this report have been truncated for expediency. Unless otherwise indicated, all sample IDs are suffixed with -01.
All data are considered acceptable and valid with the following qualifications.

HOLDING TIMES:
A holding time of 180 days has been applied to the samples. All samples were analyzed within this holding time.

TRACERS:
The following samples exhibited low tracer recovery (<80%). As a result, all reported values for the associated isotopes may be biased low and, therefore, were qualified as estimated (J).

Uranium: SS03, SS04
thorium: SS05, SS05D, SS13, SS14, SS15

The replicate of SS04 also experienced low recovery, but no action was necessary.

MATRIX SPIKES:
The soil matrix spike duplicate exceeded recovery criteria and the RPD for U-235. Consequently, U-235 sample results greater than the MDC may be biased high and were qualified as estimated (J) as follows:

Qualified "J":
SS05, SS05D, SS12, SS14, SS11-02, SS11-03

Samples SS01, SS03 and SS04 would also have been qualified "J" for U-235, but were previously qualified for other criteria.

The recovery of Th-230 was acceptable.

RA

REPLICATES:
Two replicate pairs were analyzed and evaluated for reproducibility. The data were qualified as estimated (J) only when the RPD exceeded 50% and the results reported for both analyses were greater than the MDC. The direction of bias in this instance is unknown.

Qualified "J":
Th-228: SS01, SS02, SS03, SS04, SS11-02, SS11-03
Th-232: SS01, SS02, SS03, SS04, SS11-02, SS11-03

Both sets of replicate data were acceptable for uranium.

FIELD DUPLICATE:
The results of the field duplicate were acceptable.

BLANK CONTAMINATION:
No qualifications were required.

INSTRUMENT CALIBRATION:
An efficiency check standard was analyzed on each detector approximately every 7 days, the results of which were plotted on a control chart. The values obtained were evaluated for compliance with the ±2 standard deviation limits defined on the charts. Sample analyses bracketed by acceptable standards are deemed acceptable. However, the standards which followed 2 samples were not within the established limits. In both cases, any sample values greater than the MDC were qualified as estimated (J) and may be biased low.
The following data were qualified "J":

SS01: U-234, U-235, U238
SS12: Th-228, Th-230, Th-232

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

CASE NARRATIVE

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name: Captain's Cove

NAREL Batch #: 95-00015

I. RECEIPT

A. Sample Information

NAREL Sample ID	Client Sample ID	Sample Matrix	Date Collected	Date Received	Date Analyzed
T34C 95.03167	LT-SS01-01	Soil	04/20/95	04/21/95	07/07/95
T34C 95.03168	LT-SS02-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03169	LT-SS03-01	Soil	04/20/95	04/21/95	06/26/95
T34C 95.03170	LT-SS04-01	Soil	04/20/95	04/21/95	06/26/95
T34C 95.03171	LT-SS05-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03172	LT-SS05-01D	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03173	CC-SS12-01	Soil	04/20/95	04/21/95	07/07/95
T34C 95.03174	CC-SS13-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03175	CC-SS14-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03176	CC-SS15-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03177	CC-SS11-02	Soil	04/20/95	04/21/95	06/26/95
T34C 95.03178	CC-SS11-03	Soil	04/20/95	04/21/95	06/26/95

B. Documentation Exceptions: No exceptions were encountered.

II. ANALYSIS

A. Holding Times: All holding times were met.

B. Preparation Exceptions: No exceptions were encountered.

C. Analytical Exceptions: NAREL samples T34C 95.3169, T34C 95.3170 and T34C 95.3170X formed a purple precipitate during the coprecipitation step of the uranium procedure. This step normally results in an essentially "massless" sample being deposited onto a planchet. Because of the presence of the precipitates in these samples, the alpha spectra contain smeared peaks which were rejected by NAREL counting room data reviewers. The samples were reanalyzed and similar results were obtained. We believe these samples contain interferences which cause the formation of a problematic amount of precipitate during the coprecipitation step. The results of the original analyses are contained in this report. We recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration and that the results of the replicate analysis of sample T34C 95.3170 not be used in the evaluation of the quality control samples.

The uranium analyses on NAREL samples T34C 95.03167 and T34C 95.03173 gave measured yields greater than 104%. These two samples were recounted and the results from the recounts are provided in this package.

The result from the efficiency check for detector AS10 on 6/26/95 was lost, and the check was not repeated. No samples in this batch were analyzed on AS10.

Detector AS28 is not currently in operation.

III. QUALITY CONTROL

A. Reagent Blank: All associated reagent blanks met NAREL QC criteria.

B. Tracer Yields: All samples met NAREL QC limits.

C. Matrix Spike: All spike recoveries were within NAREL QC limits.

D. Replicate Results: All replicate analyses met NAREL QC criteria. Although the results of the replicate analysis of sample T34C 95.3170 are provided in this report, we recommend that the results of the replicate analysis of this sample not be used in the evaluation of the quality control samples. The analytical problems associated with this sample are described in the Analytical Exceptions section of the case narrative.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

CASE NARRATIVE

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name: Captain's Cove

NAREL Batch #: 95-00015

I. RECEIPT

A. Sample Information

NAREL Sample ID	Client Sample ID	Sample Matrix	Date Collected	Date Received	Date Analyzed
T34C 95.03167	LT-SS01-01	Soil	04/20/95	04/21/95	07/07/95
T34C 95.03168	LT-SS02-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03169	LT-SS03-01	Soil	04/20/95	04/21/95	06/26/95
T34C 95.03170	LT-SS04-01	Soil	04/20/95	04/21/95	06/26/95
T34C 95.03171	LT-SS05-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03172	LT-SS05-01D	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03173	CC-SS12-01	Soil	04/20/95	04/21/95	07/07/95
T34C 95.03174	CC-SS13-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03175	CC-SS14-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03176	CC-SS15-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03177	CC-SS11-02	Soil	04/20/95	04/21/95	06/26/95
T34C 95.03178	CC-SS11-03	Soil	04/20/95	04/21/95	06/26/95

B. Documentation Exceptions: No exceptions were encountered.

II. ANALYSIS

A. Holding Times: All holding times were met.

B. Preparation Exceptions: No exceptions were encountered.

C. Analytical Exceptions: NAREL samples T34C 95.3169, T34C 95.3170 and T34C 95.3170X formed a purple precipitate during the coprecipitation step of the uranium procedure. This step normally results in an essentially "massless" sample being deposited onto a planchet. Because of the presence of the precipitates in these samples, the alpha spectra contain smeared peaks which were rejected by NAREL counting room data reviewers. The samples were reanalyzed and

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name: Captain's Cove

Client Sample ID: Reagent Blank

NAREL Sample #: RBLK 95.03179

NAREL Batch #: 95-00015

Date Collected: 05/03/95

Matrix: Soil

Date Received: 05/03/95

Wet weight: N/A

Date Analyzed: 06/26/95

Dry weight: N/A

Analyst: AS

Ash weight: N/A

Method: EERF-00.06

Vol/Wt Prepared: N/A

Detector ID: AS25

Activity units: pCi/Samp

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	4.27E-02	± 2.47E-02	3.12E-02
U-235	1.02E-03	± 6.62E-03	2.30E-02
U-238	3.45E-02	± 2.62E-02	4.46E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS01-01
NAREL Sample #:	T34C 95.03167	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	530.0 g
Date Analyzed:	07/07/95	Dry weight:	402.6 g
Analyst:	AS	Ash weight:	358.3 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0051 gash
Detector ID:	AS17	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	4.63E+01 J	± 8.72E+00	3.19E+00
U-235	2.11E+00	± 1.70E+00	1.35E+00
U-238	5.22E+01	± 9.34E+00	3.41E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS02-01
NAREL Sample #:	T34C 95.03168	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	539.5 g
Date Analyzed:	06/28/95	Dry weight:	467.3 g
Analyst:	AS	Ash weight:	421.5 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0050 gash
Detector ID:	AS12	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	1.07E+01	± 4.94E+00	5.75E+00
U-235	9.47E-01	± 1.32E+00	1.82E+00
U-238	2.62E+01	± 7.44E+00	4.87E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

103758

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS03-01
NAREL Sample #:	T34C 95.03169	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	932.5 g
Date Analyzed:	06/26/95	Dry weight:	768.1 g
Analyst:	AS	Ash weight:	703.6 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2541 gash
Detector ID:	AS07	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	3.28E+00 J	± 4.85E-01	8.25E-02
U-235	7.19E-01	± 1.89E-01	7.07E-02
U-238	3.24E+00	± 4.83E-01	8.25E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS04-01
NAREL Sample #:	T34C 95.03170	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	586.9 g
Date Analyzed:	06/26/95	Dry weight:	459.2 g
Analyst:	AS	Ash weight:	416.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2536 gash
Detector ID:	AS09	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	1.76E+00 J	± 3.89E-01	1.34E-01
U-235	5.24E-01	± 1.91E-01	1.03E-01
U-238	9.62E-01	± 2.70E-01	1.21E-01

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS04-01
NAREL Sample #:	T34C 95.03170X	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	586.9 g
Date Analyzed:	06/26/95	Dry weight:	459.2 g
Analyst:	AS	Ash weight:	416.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2507 gash
Detector ID:	AS11	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	1.79E+00	± 4.01E-01	1.51E-01
U-235	6.44E-01	± 2.17E-01	1.07E-01
U-238	9.90E-01	± 2.79E-01	1.25E-01

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS05-01
NAREL Sample #:	T34C 95.03171	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	406.8 g
Date Analyzed:	06/28/95	Dry weight:	293.6 g
Analyst:	AS	Ash weight:	242.5 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0050 gash
Detector ID:	AS21	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	1.55E+02	± 1.78E+01	2.97E+00
U-235	5.31E+00 J	± 2.59E+00	2.30E+00
U-238	1.65E+02	± 1.86E+01	3.30E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments: FIELD DUPLICATE RPD
U-234
235 7
238 4
<100% ✓

FORM-1 URANIUM

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS05-01D
NAREL Sample #:	T34C 95.03172	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	408.3 g
Date Analyzed:	06/28/95	Dry weight:	294.6 g
Analyst:	AS	Ash weight:	242.2 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0051 gash
Detector ID:	AS22	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	1.48E+02	± 1.78E+01	2.70E+00
U-235	5.82E+00 J	± 2.72E+00	1.24E+00
U-238	1.54E+02	± 1.83E+01	2.70E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS12-01
NAREL Sample #:	T34C 95.03173	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	444.6 g
Date Analyzed:	07/07/95	Dry weight:	402.2 g
Analyst:	AS	Ash weight:	386.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2517 gash
Detector ID:	AS18	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	7.77E-01	± 1.55E-01	4.45E-02
U-235	3.45E-02 J	± 3.03E-02	2.66E-02
U-238	7.11E-01	± 1.47E-01	2.66E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS12-01
NAREL Sample #:	T34C 95.03173M	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	444.6 g
Date Analyzed:	06/26/95	Dry weight:	402.2 g
Analyst:	AS	Ash weight:	386.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2502 gash
Detector ID:	AS17	Activity units:	pCi/gdry

AS

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	4.14E+00	± 4.72E-01	6.37E-02
U-235	2.23E-01	± 8.55E-02	7.37E-02
U-238	3.98E+00	± 4.59E-01	7.79E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS12-01
NAREL Sample #:	T34C 95.03173S	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	444.6 g
Date Analyzed:	06/26/95	Dry weight:	402.2 g
Analyst:	AS	Ash weight:	386.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2517 gash
Detector ID:	AS18	Activity units:	pCi/gdry

MSD

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	4.23E+00	± 4.44E-01	4.19E-02
U-235	2.86E-01	± 8.70E-02	2.50E-02
U-238	4.00E+00	± 4.27E-01	4.19E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS13-01
NAREL Sample #:	T34C 95.03174	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	490.8 g
Date Analyzed:	06/28/95	Dry weight:	418.0 g
Analyst:	AS	Ash weight:	398.8 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0252 gash
Detector ID:	AS23	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	1.11E+00	± 6.15E-01	7.58E-01
U-235	2.47E-02	± 1.60E-01	5.58E-01
U-238	3.45E-01	± 3.70E-01	6.72E-01

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS14-01
NAREL Sample #:	T34C 95.03175	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	453.4 g
Date Analyzed:	06/28/95	Dry weight:	366.5 g
Analyst:	AS	Ash weight:	351.1 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0126 gash
Detector ID:	AS24	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	2.39E+01	± 3.91E+00	1.01E+00
U-235	1.07E+00 J	± 7.43E-01	5.13E-01
U-238	1.86E+01	± 3.37E+00	5.13E-01

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS15-01
NAREL Sample #:	T34C 95.03176	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	459.7 g
Date Analyzed:	06/28/95	Dry weight:	376.3 g
Analyst:	AS	Ash weight:	359.0 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0126 gash
Detector ID:	AS25	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	2.08E+01	± 4.64E+00	1.83E+00
U-235	5.10E-01	± 7.71E-01	1.65E+00
U-238	1.84E+01	± 4.46E+00	3.27E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS11-02
NAREL Sample #:	T34C 95.03177	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	272.9 g
Date Analyzed:	06/26/95	Dry weight:	186.2 g
Analyst:	AS	Ash weight:	131.4 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2533 gash
Detector ID:	AS19	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	8.47E-01	± 1.55E-01	5.28E-02
U-235	3.88E-02 J	± 3.06E-02	3.76E-02
U-238	9.53E-01	± 1.66E-01	5.28E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS11-02
NAREL Sample #:	T34C 95.03177X	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	272.9 g
Date Analyzed:	06/26/95	Dry weight:	186.2 g
Analyst:	AS	Ash weight:	131.4 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2517 gash
Detector ID:	AS20	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	7.48E-01	± 1.47E-01	5.24E-02
U-235	4.18E-02	± 3.30E-02	4.04E-02
U-238	7.13E-01	± 1.44E-01	4.72E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

URANIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS11-03
NAREL Sample #:	T34C 95.03178	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	361.6 g
Date Analyzed:	06/26/95	Dry weight:	318.4 g
Analyst:	AS	Ash weight:	303.1 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2526 gash
Detector ID:	AS24	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
U-234	5.05E-01	± 1.22E-01	5.19E-02
U-235	2.75E-02 J	± 2.70E-02	2.65E-02
U-238	4.54E-01	± 1.14E-01	2.65E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

CASE NARRATIVE

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name: Captain's Cove

NAREL Batch #: 95-00015

I. RECEIPT

A. Sample Information

NAREL Sample ID	Client Sample ID	Sample Matrix	Date Collected	Date Received	Date Analyzed
T34C 95.03167	LT-SS01-01	Soil	04/20/95	04/21/95	06/29/95
T34C 95.03168	LT-SS02-01	Soil	04/20/95	04/21/95	06/29/95
T34C 95.03169	LT-SS03-01	Soil	04/20/95	04/21/95	06/27/95
T34C 95.03170	LT-SS04-01	Soil	04/20/95	04/21/95	06/27/95
T34C 95.03171	LT-SS05-01	Soil	04/20/95	04/21/95	06/27/95
T34C 95.03172	LT-SS05-01D	Soil	04/20/95	04/21/95	06/27/95
T34C 95.03173	CC-SS12-01	Soil	04/20/95	04/21/95	06/27/95
T34C 95.03174	CC-SS13-01	Soil	04/20/95	04/21/95	06/27/95
T34C 95.03175	CC-SS14-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03176	CC-SS15-01	Soil	04/20/95	04/21/95	06/28/95
T34C 95.03177	CC-SS11-02	Soil	04/20/95	04/21/95	06/27/95
T34C 95.03178	CC-SS11-03	Soil	04/20/95	04/21/95	06/27/95

B. Documentation Exceptions: No exceptions were encountered.

II. ANALYSIS

A. Holding Times: All holding times were met.

B. Preparation Exceptions: No exceptions were encountered.

C. Analytical Exceptions: The results from the efficiency check for detector AS10 on 6/26/95 was lost, and the check was not repeated. No samples in this batch were analyzed on detector AS10.

Detector AS28 is not currently in operation.

III. QUALITY CONTROL

A.	Reagent Blank:	All associated reagent blanks met NAREL QC criteria.
B.	Tracer Yields:	All samples met NAREL QC limits.
C.	Matrix Spike:	All spike recoveries were within NAREL QC limits.
D.	Replicate Results:	The results of the replicate analysis on NAREL sample 95.03177 did not meet NAREL's acceptance criteria.

IV. I certify that this data package complies with the terms and conditions of the Quality Assurance Project Plan, both technically and for completeness, other than the exceptions detailed above. Release of the data contained in this package has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

James B. Moore 8/4/95
James B. Moore Date
Quality Assurance Coordinator

John Griggs 8/4/95
John Griggs, Ph.D. Date
Chief, Monitoring
and Analytical Services Branch

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	Reagent Blank
NAREL Sample #:	RBLK 95.03179	NAREL Batch #:	95-00015
Date Collected:	05/03/95	Matrix:	Soil
Date Received:	05/03/95	Wet weight:	N/A
Date Analyzed:	06/27/95	Dry weight:	N/A
Analyst:	AS	Ash weight:	N/A
Method:	EERF-00.06	Vol/Wt Prepared:	N/A
Detector ID:	AS21	Activity units:	pCi/Samp

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	6.47E-03	± 1.92E-02	3.85E-02
Th-228	-2.22E-02	± 2.55E-02	5.22E-02
Th-230	1.02E-02	± 9.81E-03	1.33E-02
Th-232 <	5.39E-03	± 8.56E-03	1.50E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name: Captain's Cove
Client Sample ID: LT-SS01-01
NAREL Sample #: T34C 95.03167
NAREL Batch #: 95-00015
Date Collected: 04/20/95
Matrix: Soil
Date Received: 04/21/95
Wet weight: 530.0 g
Date Analyzed: 06/29/95
Dry weight: 402.6 g
Analyst: AS
Ash weight: 358.3 g
Method: EERF-00.06
Vol/Wt Prepared: 0.0051 gash
Detector ID: AS29
Activity units: pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	5.19E+00	± 3.87E+00	4.42E+00
Th-228	4.49E+00 J	± 5.24E+00	8.62E+00
Th-230	1.11E+01	± 3.70E+00	1.57E+00
Th-232	1.01E+01 J	± 3.55E+00	1.85E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS02-01
NAREL Sample #:	T34C 95.03168	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	539.5 g
Date Analyzed:	06/29/95	Dry weight:	467.3 g
Analyst:	AS	Ash weight:	421.5 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0050 gash
Detector ID:	AS30	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	-1.97E-01	± 2.79E+00	6.52E+00
Th-228	1.27E+01 J	± 6.27E+00	8.94E+00
Th-230	2.00E+01	± 4.96E+00	1.84E+00
Th-232	1.77E+01 J	± 4.65E+00	1.57E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS03-01
NAREL Sample #:	T34C 95.03169	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	932.5 g
Date Analyzed:	06/27/95	Dry weight:	768.1 g
Analyst:	AS	Ash weight:	703.6 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2541 gash
Detector ID:	AS06	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	4.84E-01	± 1.83E-01	1.21E-01
Th-228	3.12E+00 J	± 3.32E-01	1.98E-01
Th-230	5.38E+00	± 4.19E-01	9.69E-02
Th-232	3.21E+00 J	± 3.28E-01	1.56E-01

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS04-01
NAREL Sample #:	T34C 95.03170	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	586.9 g
Date Analyzed:	06/27/95	Dry weight:	459.2 g
Analyst:	AS	Ash weight:	416.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2536 gash
Detector ID:	AS07	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	1.04E-01	± 1.09E-01	1.66E-01
Th-228	6.66E-01 J	± 1.84E-01	2.06E-01
Th-230	9.25E-01	± 1.74E-01	4.90E-02
Th-232	5.83E-01 J	± 1.38E-01	4.17E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS04-01
NAREL Sample #:	T34C 95.03170X	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	586.9 g
Date Analyzed:	06/27/95	Dry weight:	459.2 g
Analyst:	AS	Ash weight:	416.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2507 gash
Detector ID:	AS09	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	1.71E-01	± 1.25E-01	1.25E-01
Th-228	7.18E-01	± 2.08E-01	2.32E-01
Th-230	1.22E+00	± 2.18E-01	6.48E-02
Th-232	5.71E-01	± 1.50E-01	6.48E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments: QC ARE NOT QUALIFIED

Ref. 13

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS05-01
NAREL Sample #:	T34C 95.03171	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	406.8 g
Date Analyzed:	06/27/95	Dry weight:	293.6 g
Analyst:	AS	Ash weight:	242.5 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0050 gash
Detector ID:	AS27	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	2.18E+01 J	± 9.46E+00	8.83E+00
Th-228	3.45E+01	± 9.08E+00	9.59E+00
Th-230	3.44E+02	± 2.47E+01	2.45E+00
Th-232	2.48E+01	± 6.49E+00	3.54E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments: [illegible] 23 [illegible] 13 [illegible] < 10% [illegible]

FORM-1 THORIUM

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	LT-SS05-01D
NAREL Sample #:	T34C 95.03172	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	408.3 g
Date Analyzed:	06/27/95	Dry weight:	294.6 g
Analyst:	AS	Ash weight:	242.2 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0051 gash
Detector ID:	AS29	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	2.75E+01 J	± 1.15E+01	8.22E+00
Th-228	3.34E+01	± 1.00E+01	1.05E+01
Th-230	3.03E+02	± 2.60E+01	2.70E+00
Th-232	2.51E+01	± 7.32E+00	3.17E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS12-01
NAREL Sample #:	T34C 95.03173	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	444.6 g
Date Analyzed:	06/27/95	Dry weight:	402.2 g
Analyst:	AS	Ash weight:	386.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2517 gash
Detector ID:	AS11	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	3.47E-02	± 1.03E-01	2.06E-01
Th-228	6.78E-01 J	± 2.02E-01	2.27E-01
Th-230	6.13E-01 J	± 1.56E-01	7.11E-02
Th-232	8.93E-01 J	± 1.88E-01	7.11E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS12-01
NAREL Sample #:	T34C 95.03173M	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	444.6 g
Date Analyzed:	06/27/95	Dry weight:	402.2 g
Analyst:	AS	Ash weight:	386.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2502 gash
Detector ID:	AS12	Activity units:	pCi/gdry

MS

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	0.00E+00	± 7.23E-02	1.85E-01
Th-228	1.10E+00	± 2.48E-01	2.37E-01
Th-230	2.48E+01	± 1.12E+00	9.04E-02
Th-232	1.24E+00	± 2.29E-01	7.58E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments: QC ARE NOT QUALIFIED

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS12-01
NAREL Sample #:	T34C 95.03173S	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	444.6 g
Date Analyzed:	06/27/95	Dry weight:	402.2 g
Analyst:	AS	Ash weight:	386.9 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2517 gash
Detector ID:	AS17 MSD	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	1.14E-01	± 1.14E-01	1.70E-01
Th-228	1.56E+00	± 2.53E-01	2.14E-01
Th-230	2.44E+01	± 9.98E-01	5.85E-02
Th-232	1.63E+00	± 2.32E-01	8.39E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments: QC ARE NOT QUALIFIED

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY Ref. 13
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY 40 of 45

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS13-01
NAREL Sample #:	T34C 95.03174	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	490.8 g
Date Analyzed:	06/27/95	Dry weight:	418.0 g
Analyst:	AS	Ash weight:	398.8 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0252 gash
Detector ID:	AS30	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	1.43E+00 J	± 1.71E+00	2.76E+00
Th-228	5.64E-02	± 1.33E+00	2.53E+00
Th-230	6.30E-01	± 5.90E-01	7.21E-01
Th-232	7.92E-02	± 2.49E-01	6.14E-01

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name: Captain's Cove
Client Sample ID: CC-SS14-01

NAREL Sample #: T34C 95.03175
NAREL Batch #: 95-00015

Date Collected: 04/20/95
Matrix: Soil

Date Received: 04/21/95
Wet weight: 453.4 g

Date Analyzed: 06/28/95
Dry weight: 366.5 g

Analyst: AS
Ash weight: 351.1 g

Method: EERF-00.06
Vol/Wt Prepared: 0.0126 gash

Detector ID: AS06
Activity units: pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	4.87E+00 J	± 3.90E+00	4.69E+00
Th-228	1.94E+01	± 5.66E+00	5.91E+00
Th-230	4.52E+01	± 7.47E+00	3.68E+00
Th-232	2.00E+01	± 5.71E+00	5.90E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS15-01
NAREL Sample #:	T34C 95.03176	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	459.7 g
Date Analyzed:	06/28/95	Dry weight:	376.3 g
Analyst:	AS	Ash weight:	359.0 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.0126 gash
Detector ID:	AS07	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	2.61E+00 J	± 3.69E+00	6.25E+00
Th-228	1.95E+01	± 5.79E+00	6.13E+00
Th-230	3.94E+01	± 6.90E+00	1.80E+00
Th-232	1.62E+01	± 4.40E+00	1.53E+00

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY Ref. 13
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY 43 of 45

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS11-02
NAREL Sample #:	T34C 95.03177	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	272.9 g
Date Analyzed:	06/27/95	Dry weight:	186.2 g
Analyst:	AS	Ash weight:	131.4 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2533 gash
Detector ID:	AS18	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	2.36E-01	± 1.05E-01	9.30E-02
Th-228	1.13E+00 J	± 1.65E-01	1.34E-01
Th-230	9.26E-01	± 1.33E-01	2.43E-02
Th-232	1.22E+00 J	± 1.53E-01	1.41E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS11-02
NAREL Sample #:	T34C 95.03177X	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	272.9 g
Date Analyzed:	06/27/95	Dry weight:	186.2 g
Analyst:	AS	Ash weight:	131.4 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2517 gash
Detector ID:	AS19	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	1.07E-01	± 9.24E-02	1.28E-01
Th-228	3.81E-01	± 1.30E-01	1.60E-01
Th-230	7.70E-01	± 1.40E-01	4.57E-02
Th-232	5.36E-01	± 1.17E-01	4.57E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments: QC ARE NOT SUPPLIED

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY

THORIUM RADIOCHEMICAL ANALYTICAL RESULTS

Project Name:	Captain's Cove	Client Sample ID:	CC-SS11-03
NAREL Sample #:	T34C 95.03178	NAREL Batch #:	95-00015
Date Collected:	04/20/95	Matrix:	Soil
Date Received:	04/21/95	Wet weight:	361.6 g
Date Analyzed:	06/27/95	Dry weight:	318.4 g
Analyst:	AS	Ash weight:	303.1 g
Method:	EERF-00.06	Vol/Wt Prepared:	0.2526 gash
Detector ID:	AS20	Activity units:	pCi/gdry

Analytical Results

Nuclide	Activity	2σ Uncertainty	MDC
Th-227	-3.05E-02	± 5.57E-02	1.62E-01
Th-228	4.71E-01 J	± 1.62E-01	2.08E-01
Th-230	4.67E-01	± 1.16E-01	4.81E-02
Th-232	4.45E-01 J	± 1.14E-01	4.81E-02

QA/QC Reference Samples

QC Sample	NAREL Sample Number
Reagent Blank	RBLK 95.03179
Replicate 1	T34C 95.03170X
Replicate 2	T34C 95.03177X
Matrix Spike	T34C 95.03173M
Matrix Spike Duplicate	T34C 95.03173S

Comments:

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THE ATOMIC NUCLEUS

Robley D. Evans, Ph.D.

PROFESSOR OF PHYSICS
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

New York Toronto London

McGRAW-HILL BOOK COMPANY, INC.

1955

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(*b*) What is the "partial half-period" for negatron β decay, i.e., the half-period for a Cu^{64} nucleus in which the possibility of other modes of decay has been turned off?

(*c*) Evaluate in millicuries a source of Cu^{64} which emits 3.7×10^7 negatron β rays per second.

Ans.: (*b*) 32.0 hr; (*c*) 2.5 mc.

2. Determine the half-period of K^{40}, knowing that ordinary potassium (*a*) is a mixture of K^{39}, K^{40}, and K^{41} containing 0.0119 atom per cent K^{40}; (*b*) emits 31 β rays/sec per gram in transitions of $K^{40} \xrightarrow{\beta^-} Ca^{40}$; and (*c*) emits 3.4 γ rays/sec per gram in electron-capture transitions $K^{40} \xrightarrow{EC} A^{40}$, and every EC transition is accompanied by just one photon. *Ans.*: 1.15×10^9 yr.

3. Compute the number of grams and the number of radioactive atoms contained in 1 mc of (*a*) radiosodium (Na^{24}, $T = 14.8$ hr); (*b*) radiophosphorus (P^{32}, $T = 14.5$ days); and (*c*) radium (Ra^{226}, $T = 1{,}620$ yr). *Ans.*: mass, 1.1×10^{-10} g of Na^{24}; 3.5×10^{-9} g of P^{32}; 0.0010 g of Ra.

4. (*a*) A radioactive substance has a mean life τ sec, an activity of a_1 disintegrations per second at time t_1, and an activity of a_2 at time t_2. Show that the number of atoms $(A_1 - A_2)$ disintegrating between t_1 and t_2 is

$$A_1 - A_2 = \tau(a_1 - a_2)$$

(*b*) If the average energy per β ray of 12.6-hr iodine I^{130} is 0.29 Mev, determine the β-ray energy in ergs liberated in 24 hr by an iodine source whose initial strength is 1 mc.

(*c*) If this iodine is present in 2 g of thyroid tissue, determine the radiation dose absorbed in 24 hr by the tissue, remembering that 1 rep (roentgen equivalent physical) corresponds to the absorption of 94 ergs per gram of tissue. *Ans.*: (*b*) 8.2×10^5 ergs; (*c*) 4,400 rep.

5. In 1 g of natural uranium,

(*a*) What is the activity of U^{238}, UX_1, UX_2, and U^{234}, in μc?

(*b*) What is the ratio of the activity of U^{235} to that of U^{238}?

(*c*) What is the number of spontaneous fissions per hour?

DATA: The decay series of U^{238} and U^{235} and half-periods are

$$_{92}U^{238} \xrightarrow[4.51 \times 10^9 \text{ yr}]{\alpha} UX_1 \xrightarrow[24.1 \text{ d}]{\beta} UX_2 \xrightarrow[1.14 \text{ min}]{\beta} U^{234} \xrightarrow[2.35 \times 10^5 \text{ yr}]{\alpha} Io$$

$$\rightarrow Io \xrightarrow[8.0 \times 10^4 \text{ yr}]{\alpha} Ra^{226} \xrightarrow[1{,}620 \text{ yr}]{\alpha} Rn \xrightarrow[3.82 \text{ d}]{\alpha} \cdots$$

$$_{92}U^{235} \xrightarrow[7.1 \times 10^8 \text{ yr}]{\alpha} UY \xrightarrow[25.6 \text{ hr}]{\beta} Pa \xrightarrow[3.43 \times 10^4 \text{ yr}]{\alpha} Ac \xrightarrow[22 \text{ yr}]{\beta} RdAc \xrightarrow[18.9 \text{ d}]{\alpha} AcX^{223} \xrightarrow[11.2 \text{ d}]{\alpha} \cdots$$

In natural uranium, there is 1 atom of U^{235} per 139 atoms of U^{238}. The partial half-periods for spontaneous fission are

U^{238}	8.0×10^{15} yr
U^{235}	1.9×10^{17} yr
U^{234}	2×10^{16} yr

Insert 21.1 ≈ 22
$^{238}U = ^{234}U$ activity

✓ *Ans.*: (*a*) 0.33 μc per gram U for each; (*b*) 0.046; (*c*) 25 fissions per hour per gram U (these are generally useful numbers, worth memorizing).

6. If an atom is known to exist at $t = 0$, what is its probability of decaying in the time interval Δt between t and $t + \Delta t$, if its decay constant is λ? Under what restrictions does this general relationship reduce to simply $\lambda\, \Delta t$?

Ans.: $(1 - e^{-\lambda \Delta t})e^{-\lambda t}$; reduces when $\lambda t \ll 1$ and $\lambda\, \Delta t \ll 1$.

2. *Radioactive-s*

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If this is to be va
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The coefficient h_B
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Hence $h_B = -h_A$,

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that of its product. After t_m the activity of the product must therefore exceed that of its parent.

d. Daughter Much Shorter-lived Than Parent. When the half-period of the daughter product is negligible compared with that of its parent, then Eq. (2.9) takes on a particularly simple form. Then $\lambda_A \ll \lambda_B$, and Eq. (2.9) becomes

$$B\lambda_B = A\lambda_A(1 - e^{-\lambda_B t}) \tag{5.8}$$

The daughter activity $B\lambda_B$ increases according to the simple exponential growth curve governed by *its own decay constant* λ_B. This was the historically important case discovered by Rutherford and Soddy (R52) in the growth of ThX (T = 3.64 days) from thorium (actually from RdTh, T = 1.90 yr). Other important examples include the growth of radon in radium sources, etc. In these cases the equilibrium ratio of activities becomes substantially unity. Note then that

$$B\lambda_B = A\lambda_A \qquad \text{for } t \gg T_B \tag{5.9}$$

only if $T_A \gg T_B$. This condition is spoken of classically as *secular equilibrium.*

6. *Yield of a Radioactive Nuclide Produced by Nuclear Bombardment*

Consider any nuclear reaction which results in the production of a radioactive nuclide, e.g.,

$$_{11}\text{Na}^{23} + \text{H}^2 \rightarrow \text{H}^1 + {}_{11}\text{Na}^{24}$$

In this reaction the number of target atoms of Na^{23} which are accessible to the deuteron beam can be called A_0. The probability of transforming one of these atoms into Na^{24} in unit time can be called λ_A. Then $A_0\lambda_A$ is the rate at which new atoms of Na^{24} are produced. We see that the target is to be treated mathematically as though it were a parent source, having an activity $A_0\lambda_A$, and producing a radioactive substance B. Thus the scheme

$$A \underset{\lambda_A}{\rightarrow} B \underset{\lambda_B}{\rightarrow} C$$

represents the reactions

$$\text{Na}^{23} \xrightarrow[\lambda_A]{(d,p)} \text{Na}^{24} \xrightarrow[\lambda_B]{\beta^-} \text{Mg}^{24}$$

The probability λ_A of producing the (d,p) reaction is very small, but the number of target atoms A_0 is very large. Hence, mathematically,

$$A_0\lambda_A \text{ is finite} \qquad \lambda_A \rightarrow 0 \qquad A_0 \rightarrow \infty$$

Usually, a negligible fraction of the atoms of the target is transformed so that the number of residual target atoms, $A = A_0e^{-\lambda_A t}$, is effectively equal to A_0. However, in some exceptional instances a measurable fraction of the target may be consumed, such as in the production of plutonium through intense and prolonged neutron irradiation of uranium.

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